

EDC IN-LINE PUMPS
WITH RE-POSITIONER

Workshop: EP
09.1995
SI 0498 En

New rack and modified assembly
sequence for RE-positioner with
"high oil level"

Certain EDC in-line pumps of types
PE(S)..P.., PE..R.., PE(S)..H..)
make use of RE-positioners with
"high oil level".

FEATURES OF "HIGH OIL LEVEL":

- * No oil pump in positioner
(drainage pump).
- * No radial-lip-type oil seal in
positioner-end camshaft bearing
of injection pump.
- * Sealing of rack (in shutoff position)
in positioner-end rack bushing no
longer necessary.
- * Oil level in positioner corresponds
to oil level in camshaft chamber of
injection pump.

MODIFIED RACK AND RACK BEARING:

Discontinuation of the rack seal permitted standardization of rack and bearing with the versions used in mechanically governed injection pumps, i.e. rack guide bushing on either side, positioner-end bushing pressed in and fixed by a threaded sleeve.

The holder for the RPS short-circuiting ring and the thrust piece for the injected-quantity solenoid are bolted to the rack with two micro-encapsulated M5 bolts.

ASSEMBLY INSTRUCTIONS:

The assembly sequence differs as follows from the existing instructions for the various injection-pump versions with RE-positioner:

- * Before removing the rack, screw out the two screws and remove holder for short-circuiting ring, thrust piece, spring seat and spring.
- * On assembly: Remove residual micro-encapsulation from threads of both fastening screws and from tapped holes in thrust piece.

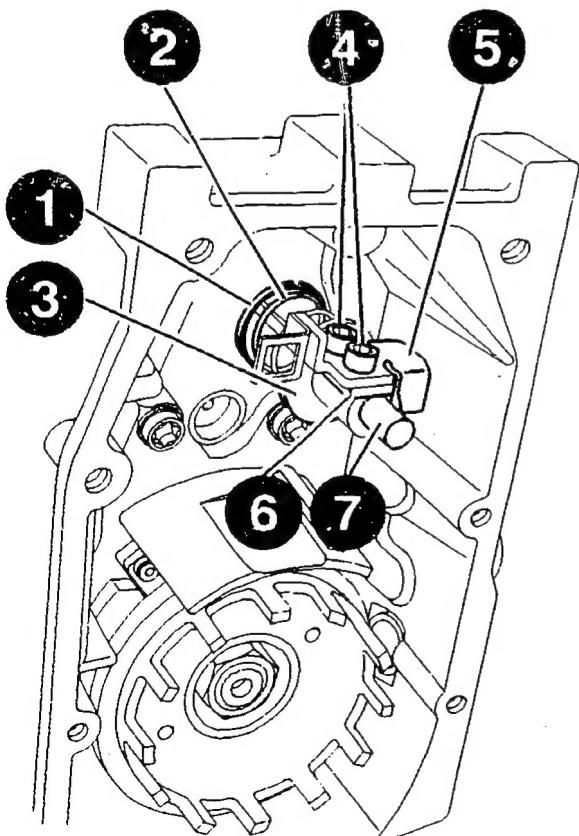
ASSEMBLY INSTRUCTIONS:

- * Coat threads of both fastening screws with locking compound "Loctite 242".

After inserting spring and spring seat, mount holder for short-circuiting ring and thrust piece on rack. Tighten screws to 4.0...5.0 Nm.

- 1= Threaded sleeve for rack guide
- 2= Spring
- 3= Spring seat
- 4= Fastening screws
- 5= Holder for short-circuiting ring
- 6= Rack
- 7= Thrust piece

KMK06167



ASSEMBLY INSTRUCTIONS:

- * The position of the short-circuiting ring is checked as described in the respective repair and test instructions with the setting gauges provided.
- * Thanks to the screw attachment, the short-circuiting ring holder with riveted-on ring can be replaced separately if necessary.

Published by:

Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)

Please direct questions and comments
concerning the contents to our
authorized representative in your
country

EDC IN-LINE PUMPS
WITH RE-POSITIONER

Workshop: EP
09.1995
ST 0499 En

RE-positioner:

General introduction of actuator with
Hi-eX bushing

The "Hi-eX actuator", which service
telegram ST 0439 ("PE..P..with
RE 30, positioner conversion")
stipulated as initially only being
envisioned for Scania positioners, is
now being introduced for all
RE positioners.

Introduction of the actuator with
Hi-eX bearing instead of the version
with bronze bearing represents a
successfully tested means of avoiding
isolated cases of actuator failure
caused by bearing wear.

The Hi-eX actuator has already been
introduced as standard in the
positioners of several vehicle
manufacturers.

This means that whenever repairs involving actuator replacement are performed, exclusive use is to be made of actuators with Hi-eX bearing. The old actuators with bronze bearing are no longer permissible.

This measure affects the actuators of all positioners supplied to date:

RE 24, RE 30 (P-pumps)

RE 31 (R-pumps)

RE 33, RE 36 (H-pumps)

ACTUATORS AFFECTED:

Injected-quantity actuator, all positioners

RE 24, 30 (P-pump), RE 31 (R-pump),

RE 33, 36 (H-pump):

* Invalid (bronze bearing):

3 427 210 104

* New (Hi-eX bearing): 2 427 210 019

Start of injection actuator, positioners

RE 33, RE 36 (H-pump):

* Invalid (bronze bearing):

2 427 210 017

* New (Hi-eX bearing): 2 427 210 023

IMPORTANT:

Service telegram ST 0439 ("PE..P..with RE 30, positioner conversion") retains its full validity as regards EDC pumps/positioners for Scania, i.e. on conversion to Hi-ex actuator simultaneous conversion to "high oil level".

As regards the EDC pumps/positioners of all other vehicle manufacturers, no additional conversion measures are to be performed on installing the Hi-ex actuator, irrespective of the oil level.

FAULT SYMPTOM:

The fault symptom described in the service telegrams "PE..P..with RE 30, idle instability" and "PE..P..with RE 30, positioner conversion", namely unstable control behavior in idle and intermediate speed range, applies to a worn electromagnet armature bushing.

Bearing wear in the start of delivery actuator results in the same phenomena and also in poor emission performance.

FAULT SYMPTOM (continued):

When performing trouble-shooting, attention is however always to be paid when dealing with "unstable control behavior" complaints to other possible causes such as loose crimps, damaged connectors, injected-quantity scatter or defective nozzles in addition to increased bearing wear. Appropriate tests are to be performed prior to positioner disassembly.

BEARING ASSESSMENT:

Testing and assessment of bearing clearance are likewise governed by the service telegrams "PE..P..with RE 30, idle instability" and "PE..P.. with RE 30, positioner conversion". Particular attention is to be paid to the notes on wear stages.

MARKING:

Following conversion to Hi-eX actuator
the positioner is to be stamped with
an "H" in the immediate vicinity of the
positioner rating plate.

WARRANTY:

The standard warranty provisions apply
with no further special stipulations.

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

MERCEDES-BENZ
TRUCKS
OM 442 LA (320 kW)

Motor vehicles: NKW
and workshop: EP
09.1995
ST 0500 En

Engine vibration in low speed range

Governor conversion proposal for
injection-pump assemblies

The following injection-pump
assemblies (EPK) can be converted
on the basis of this conversion
recommendation if complaints about
"engine vibration in low speed
range" are received.

The following may be affected:

EPK	0 402 648 947
Pump	0 412 628 869
	(PE 8 P120A320 LS 7859)
Governor	0 421 801 668
	(RQ 300/950 PA 1032-5)

EPK	0 402 648 947
Pump	0 412 628 869
	(PE 8 P120A320 LS 7859)
Governor	0 421 801 741
	(RQ 300/950 PA 1032-12)

EPK 0 402 648 953
Pump 0 412 628 869
 (PE 8 P120A320 LS 7859)
Governor 0 421 814 040
 (RQV 300...950 PA 1033-10)

EPK 0 402 648 955
Pump 0 412 628 869
 (PE 8 P120A320 LS 7859)
Governor 0 421 801 675
 (RQ 300/950 FA 1031-9)

Conversion work and setting are classed as a variation on the basic pump.

The converted IP is to be marked with an additional letter after the EPK (refer to marking of converted IP).

Governor conversion is to be performed in line with the existing repair instructions (W-400...) for RQ/RQV governors.

To minimize vehicle downtimes, the parts required for injection-pump conversion are to be procured in advance from Bosch Service.

This necessitates close coordination between MB dealers and Bosch Service Stations.

Conversion procedure:

1. Incoming inspection of pump on test bench (compile test record)
2. Pump conversion
3. Setting of pump on test bench
4. Marking of converted pump

The incoming and outgoing inspection values must be noted down in an injection-pump test record.

The following parts are needed for
governor conversion.
These parts can be ordered in advance
from KH for express delivery.

* CONVERSION PARTS

Governor 0 421 801 668
(RQ 300/950 PA1032-5)
0 421 801 675
(RQ 300/950 PA1031-9)
0 421 801 741
(RQ 300/950 PA1032-12)

Alteration of idle spring:

from	--->	to
1 424 617 022	--->	1 424 618 015

Governor 0 421 814 040
(RQV 300...950 PA 1033-10)

Alteration of flyweight assembly:

from	--->	to
Idle spring		
2 424 618 054	--->	2 424 617 038
Spring		
2 424 633 013	--->	2 424 633 016
1x washer under		
idle spring (0.5 mm)		1 200 102 624
Variable-fulcrum lever		
1 422 033 068	--->	1 422 033 062
Guide sleeve		
1 421 332 077	--->	2 421 332 036

* MARKING OF CONVERTED INJECTION
PUMPS

After conversion, an additional letter is to be marked on the pump rating plate after the assembly number.

EPK 0 402 648 947
Pump 0 412 628 869
(PE 8 P120A320 LS 7859)
Governor 0 421 801 668
(RQ 300/950 PA 1032-5)
Mark with additional letter "S":
0 402 648 947 S

EPK 0 402 648 947
Pump 0 412 628 869
(PE 8 P120A320 LS 7859)
Governor 0 421 801 741
(RQ 300/950 PA 1032-12)
Mark with additional letter "A":
0 402 648 947 A

EPK 0 402 648 953
Pump 0 412 628 869
(PE 8 P120A320 LS 7859)
Governor 0 421 814 040
(RQV 300...950 PA 1033-10)
Mark with additional letter "C":
0 402 648 953 C

EPK 0 402 648 955
Pump 0 412 628 869
(PE 8 P120A320 LS 7859)
Governor 0 421 801 675
(RQ 300/950 PA 1031-9)
Mark with additional letter "A":
0 402 648 955 A

* TEST SPECIFICATIONS

(as opposed to previous test specification sheets 0 402 648 947, ...953 and ...955)

Full-load setting:

$n = 550 \text{ min}^{-1}$	$Q = 254 +2 \text{ mm}^3/\text{s}$
$n = 950 \text{ min}^{-1}$	$Q = 241 +2 \text{ mm}^3/\text{s}$

Test specifications will be published under 0 402 648 947 A or ...947S and 0 402 648 953 C as well as 0 402 648 955A when microcards are next distributed.

* WORK UNITS AND COSTS

Use is to be made of the currently valid work units for governor conversion and EPK testing.

The costs of conversion are to be billed to the customer.

Mercedes-Benz (MB) dealers have been informed to this effect.

Published by:

ROBERT BOSCH GMBH
Division KH
Technical After-Sales Service
(KH/VKD 2)

Please direct questions and comments concerning the contents to our authorized representative in your country

MERCEDES-BENZ
TRUCKS
OM 402 LA (280 kW/380 PS)

Motor vehicles: NKW
and workshop: EP
09.1995
ST 0501 En

Engine vibration in low speed range

Governor conversion proposal for
injection-pump assemblies

The following injection-pump
assemblies (EPK) can be converted
on the basis of this conversion
recommendation if complaints about
"engine vibration in low speed
range" are received.

The following may be affected:

EPK	0 402 648 928
Pump	0 412 628 863
	(PE 8 P120A320 LS 7847)
Governor	0 421 801 640
	(RQ 300/1050 PA 1030)

EPK	0 402 648 928
Pump	0 412 628 879
	(PE 8 P120A320 LS 7847-1)
Governor	0 421 801 640
	(RQ 300/1050 PA 1030)

EPK 0 402 648 929
Pump 0 412 628 863
(PE 8 P120A320 LS 7847)
Governor 0 421 813 991
(RQV 300...950 PA 1033-1)

EPK 0 402 648 930 (E-Gas)
Pump 0 412 628 863
(PE 8 P120A320 LS 7847)
Governor 0 421 801 645
(RQ 300/1050 PA 1031-2)

EPK 0 402 648 931
Pump 0 412 628 863
(PE 8 P120A320 LS 7847)
Governor 0 421 801 646
(RQ 300/950 PA 1032-1)

EPK 0 402 648 933 (E-Gas)
Pump 0 412 628 863
(PE 8 P120A320 LS 7847)
Governor 0 421 801 647
(RQ 300/950 PA 1031-3)

EPK 0 402 648 940
Pump 0 412 628 863
(PE 8 P120A320 LS 7847)
Governor 0 421 801 661
(RQ 300/950 PA 1032-4)

EPK 0 402 648 941
Pump 0 412 628 863
(PE 8 P120A320 LS 7847)
Governor 0 421 814 019
(RQV 300...950 PA 1033-7)

EPK	0 402 648 942 (E-Gas)
Pump	0 412 628 863
	(PE 8 P120A320 LS 7847)
Governor	0 421 801 662
	(RQ 300/950 PA 1031-6)
EPK	0 402 648 945
Pump	0 412 628 863
	(PE 8 P120A320 LS 7847)
Governor	0 421 801 666
	(RQ 300/1050 PA 1030-6)
EPK	0 402 648 946 (E-Gas)
Pump	0 412 628 863
	(PE 8 P120A320 LS 7847)
Governor	0 421 801 667
	(RQ 300/1050 PA 1031-7)

Conversion work and setting are classed as a variation on the basic pump.

The converted IP is to be marked with an additional letter after the EPK (refer to marking of converted IP).

Governor conversion is to be performed in line with the existing repair instructions (W-400/...) for RQ/RQV governors.

To minimize vehicle downtimes, the parts required for injection-pump conversion are to be procured in advance from Bosch Service.

This necessitates close coordination between MB dealers and Bosch Service Stations.

Conversion procedure:

1. Incoming inspection of pump on test bench (compile test record)
2. Pump conversion
3. Setting of pump on test bench
4. Marking of converted pump

The incoming and outgoing inspection values must be noted down in an injection-pump test record.

The following parts are needed for governor conversion.
These parts can be ordered in advance from KH for express delivery.

* CONVERSION PARTS

Governor 0 421 801 640
(RQ 300/950 PA 1030)
0 421 801 645
(RQ 300/950 PA 1031-2)
0 421 801 666
(RQ 300/950 PA 1030-6)
0 421 801 667
(RQ 300/1050 PA 1031-7)

Alteration of flyweight assembly:

from	--->	to
Flyweight assembly		
2 428 110 320	--->	2 428 110 376

Part required		
Pressure spring		
1 424 617 037	--->	2 424 617 002
Pressure spring		
1 424 617 022	--->	1 424 618 015
1x washer		
1 200 102 624		

Governor 0 421 801 646
(RQ 300/950 PA 1032-1)
0 421 801 647
(RQ 300/950 PA 1031-3)
0 421 801 661
(RQ 300/950 PA 1032-4)
0 421 801 662
(RQ 300/950 PA 1031-6)

Alteration of flyweight assembly:

from ---> to

Flyweight assembly:

2 428 110 320 ---> 2 428 110 376

Part required

Pressure spring

1 424 617 037 ---> 2 424 617 002

Pressure spring

2 424 623 003 ---> 1 424 632 011

Pressure spring

1 424 617 022 ---> 1 424 618 015

1x washer 1 200 102 623

Governor 0 421 813 991
(RQV 300...950 PA 1033-1)
0 421 814 019
(RQV 300...950 PA 1033-7)

Alteration of flyweight assembly:
from ---> to

		Part required
Idle spring		
2 424 618 054	--->	2 424 617 038
Spring		
2 424 633 013	--->	2 424 633 016
1x washer under		
idle spring (0.5 mm)		1 200 102 624
Variable-fulcrum lever		
1 422 033 068	--->	1 422 033 062
Guide sleeve		
1 421 332 077	--->	2 421 332 036

* MARKING OF CONVERTED INJECTION
PUMPS

After conversion, an additional letter "S" is to be marked on the pump rating plate after the assembly number.

0 402 648 928 S	0 402 648 929 S
0 402 648 930 S	0 402 648 931 S
0 402 648 933 S	0 402 648 940 S
0 402 648 941 S	0 402 648 942 S
0 402 648 945 S	0 402 648 946 S

* TEST SPECIFICATIONS

Test specifications will be published
in the next microcard issue under

0 402 648 928 S
0 402 648 930 S
0 402 648 933 S
0 402 648 941 S
0 402 648 945 S

0 402 648 929 S
0 402 648 931 S
0 402 648 940 S
0 402 648 942 S
0 402 648 946 S

* WORK UNITS AND COSTS

Use is to be made of the currently
valid work units for governor
conversion and EPK testing.

The costs of conversion are to be
billed to the customer.

Mercedes-Benz (MB) dealers have been
informed to this effect.

Published by:

**ROBERT BOSCH GMBH
Division KH
Technical After-Sales Service
(KH/VKD 2)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

IN-LINE PUMPS PE (S) .. Workshop: EP
09.1995
SI 0502 En

Tightening torques and assembly instructions for injection pumps of sizes P, R and H for installation on engine

In line with OEM requirements, BOSCH supplies the above-mentioned injection pumps with the following types of mounting:

- * Cradle mounting
- * Flat-bed mounting
- * Flange mounting

There are defined tightening torques and corresponding assembly instructions for each of these types of mounting.

In the event of non-compliance with this information, the injection pump may be subject to torsion with resultant malfunctioning or even destruction of the IP assembly.

The following torsion-induced damage may be encountered:

- * Housing cracks
- * Tearing-off of pump mounts
- * Pump stiffness
- * Destruction of pump camshaft bearings

The damage indicated does not always occur immediately following installation of the injection pump in the engine.

Such damage is produced by lengthy operation, being influenced by temperature and engine vibration.

The following information is to be viewed as ADDITIONAL INSTRUCTIONS for installation of injection pump on engine.

THE VEHICLE MANUFACTURER'S DATA
ALWAYS APPLY!

The next coordinate provides a table of contents arranged according to injection-pump size. Depending on type of mounting (cradle, flat bed, flange) reference is then made in the table to the appropriate page in the installation instructions as well as to the tightening procedure.

I M P O R T A N T

Tightening torques in the service info possibly differing from the vehicle manufacturer's data are marked with " *A " after the value.

P A G E

Pump	Cradle	Flat bed	Flange	
P 1	4	7	10	->
P 3000	4	7	10	->
P 7100	5+6	7	10	->
P 8000	5+6	8+9	10	->
P 8500	5+6	8+9	10	->
H 1	5+6	8+9	10	->
H 1000	-	8+9	10	->
R 1500	-	8+9	10	->

C R A D L E M O U N T I N G (P1, P3000)

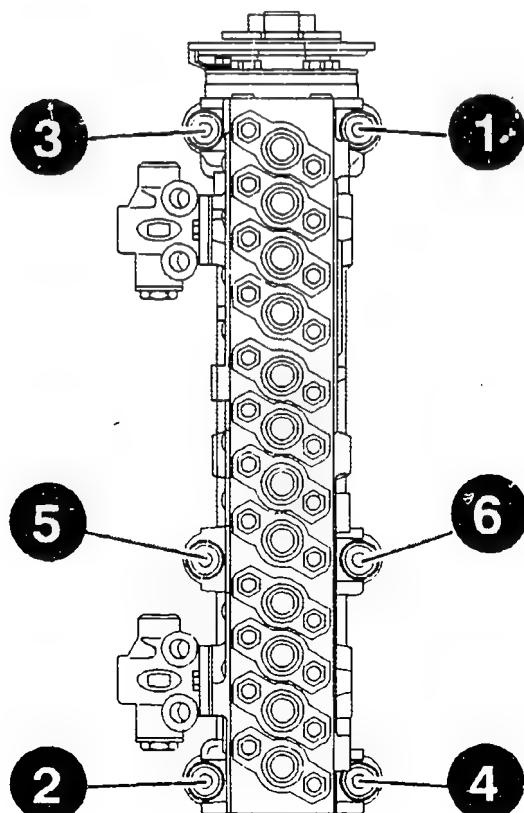
TIGHTENING PROCEDURE:

- Pretightening to 10...15 Nm
- Final tightening to 50...55 Nm *A

Assembly sequence: 1-2-3-4-(5-6)
(see fig., bottom)

Bolt strength: \geq 8.8

KMK06201



C R A D L E M O U N T I N G (P7100, P8000, P8500, H1)

TIGHTENING PROCEDURE:

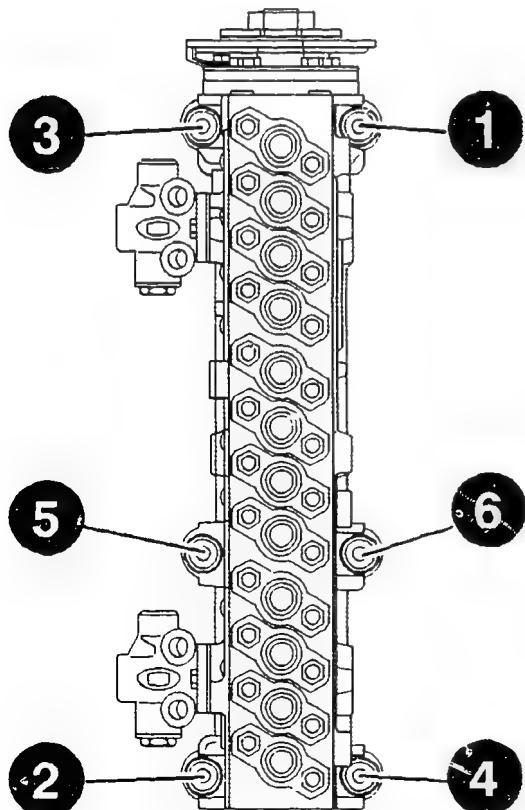
- Pretightening to 10...15 Nm
- Final tightening to 50...55 Nm *A
- Turn-on angle 90...100 Grad-WAM *A
(WAM = angle tightening method)

Assembly sequence: 1-2-3-4-(5-6)
(see fig., bottom)

Bolt strength: 8.8

For the angle tightening method to be effective, it is imperative that use be made of bolts of strength class 8.8 (no greater!).

KMK06201



C R A D L E M O U N T I N G
(P7100, P8000, P8500, H1, H1000, R1500)

As the angle tightening method causes elongation of the fastening bolts, these must be scrapped after once-only use and replaced with new ones. Non-observance may result in bolt fracture.

F L A T-B E D M O U N T I N G
(P1, P3000, P710C)

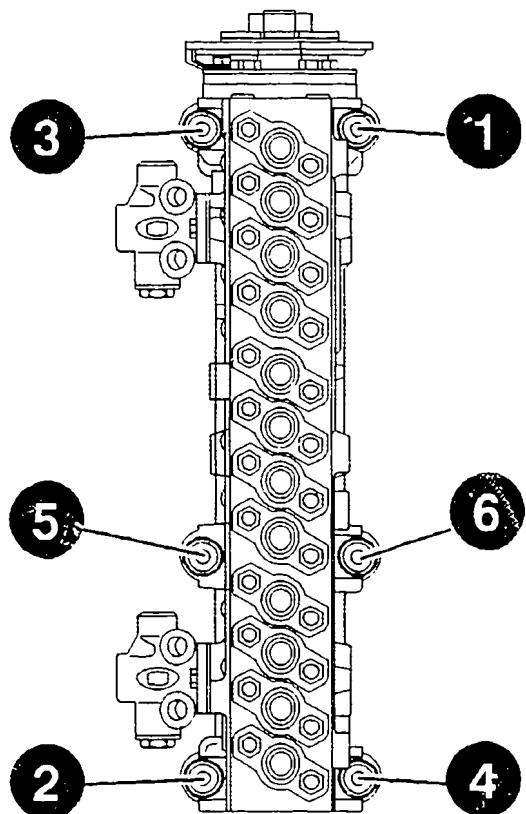
TIGHTENING PROCEDURE:

- Pretightening to 10...15 Nm
- Final tightening to 50...55 Nm *A

Assembly sequence: 1-2-3-4-(5-6)
(see fig., bottom)

Bolt strength: >= 8.8

KMK06201



F L A T-B E D M O U N T I N G
(P8000, P8500, H1, H1000, R1500)

TIGHTENING PROCEDURE:

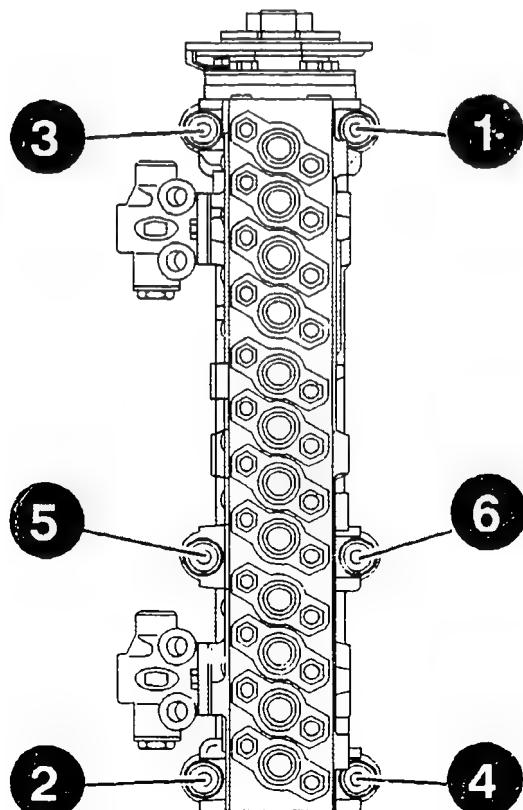
- Pretightening to 10...15 Nm
- Final tightening to 50...55 Nm *A
- Turn-on angle 90...100 Grad-WAM *A
(WAM = angle tightening method)

Assembly sequence: 1-2-3-4-(5-6)
(see fig., bottom)

Bolt strength: 8.8

For the angle tightening method to be effective, it is imperative that use be made of bolts of strength class 8.8 (no greater!).

KMK06201



**F L A T-B E D M O U N T I N G
(P8000, P8500, H1, H1000, R1500)**

As the angle tightening method causes elongation of the fastening bolts, these must be scrapped after once-only use and replaced with new ones. Non-observance may result in bolt fracture.

FLANGE MOUNTING (All sizes - standard situation)

The following values apply to the standard situation, i.e. through-bolt through pump flange, attachment thread in engine flange.

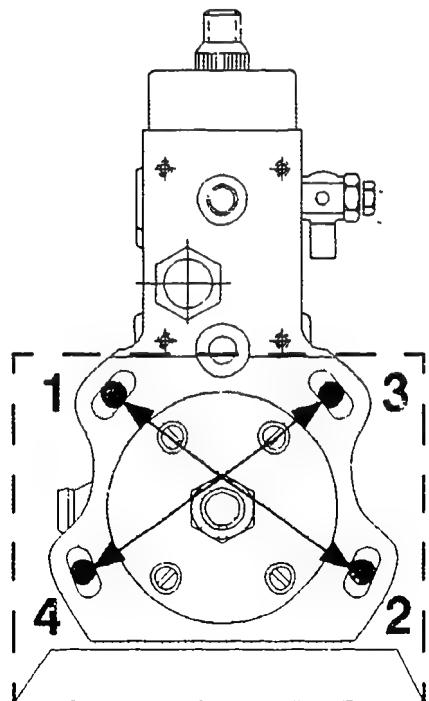
TIGHTENING PROCEDURE - FLANGE:

- Pretightening to 10...15 Nm
- Final tightening to 50...55 Nm *A

Assembly sequence: 1-2-3-4
tighten diagonally
(see fig., bottom)

Bolt strength: ≥ 8.8

KMK06202



F L A N G E M O U N T I N G
(All sizes - special case)

Special values apply to special cases in which the attachment thread is in the pump flange and screw connection is made from wheel house.

These special values are to be obtained from the vehicle manufacturer.

F L A N G E M O U N T I N G
(continued)

TIGHTENING PROCEDURE - REAR SUPPORT:

* Tightening to 20...25 Nm

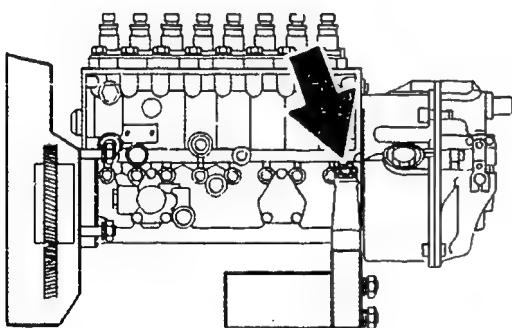
**Assembly sequence: Torsion-free on
both sides**

Bolt strength: ≥ 8.8

Attention:

**Pay attention to following information
regarding adjustment of rear support
(item b).**

KMK06203



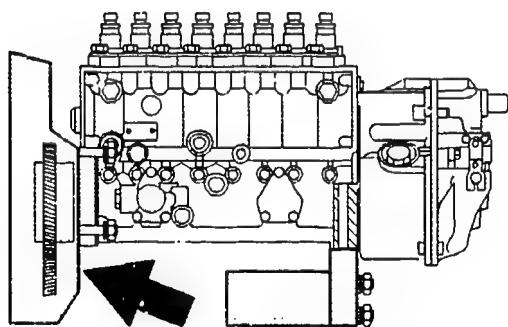
FLANGE MOUNTING (continued)

Injection pumps with flange mounting have two different mounting surfaces on the engine:

a. Engine flange (fig., arrow)

The engine flange is the main injection-pump mounting flange. This is where the injection pump is secured first.

KMK06204



FLANGE MOUNTING (continued)

b. Rear support (fig., arrow)

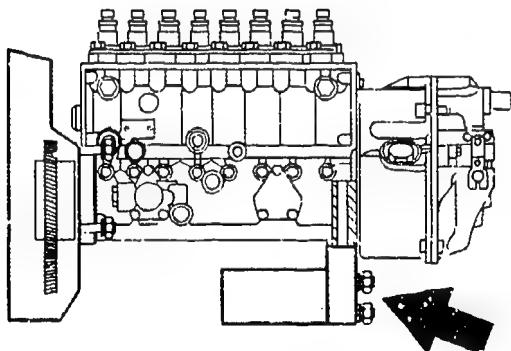
The rear support acts as additional holder for the injection pump and can be adjusted.

When installing the injection pump proper mounting must be checked with a feeler gauge.

If necessary the rear support MUST be readjusted so as to guarantee torsion-free support for the pump on either side.

Then tighten screw connections of rear support as indicated by vehicle manufacturer.

KMK06205



FLANGE MOUNTING

(continued)

The following examples illustrate the causes of torsion.

REAR SUPPORT TOO HIGH OR TOO LOW:

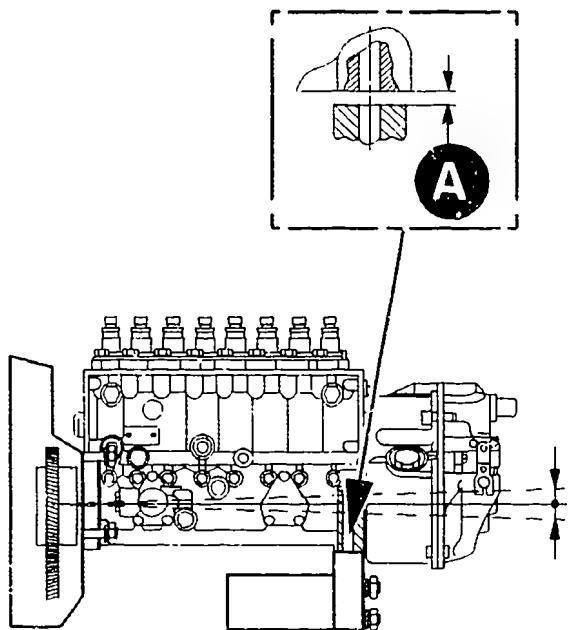
After fastening the first flange bolt the pump tilts about its longitudinal axis (fig.), i.e. a gap (A) is produced between the rear support and the lower edge of the pump or the pump is already incorrectly positioned with respect to the rear support (detail).

Fault elimination:

Correct position of rear support.

(Pay attention to adjustment instructions in item b).

KMK06206



FLANGE MOUNTING (continued)

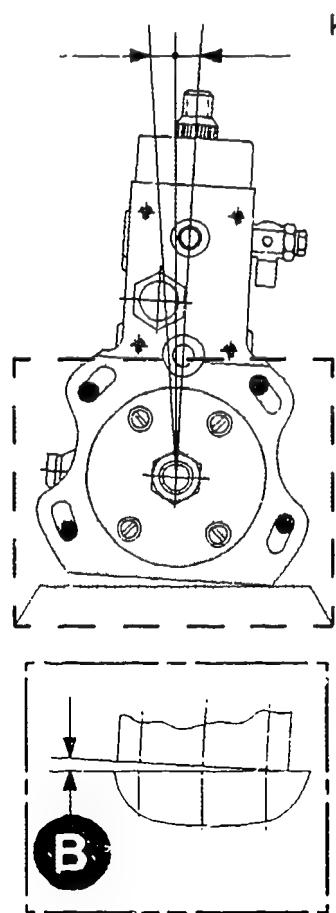
INJECTION PUMP ASKEW

The pump is tilted about its perpendicular axis (fig.) and is outside the adjustment range of the rear support. A one-sided wedge-shaped gap B (detail) is produced.

If the pump fastening bolts at the rear support are then tightened, the pump will be subjected to torsional stress.

Fault elimination:
Adjust rear support.

(Pay attention to adjustment instructions in item b).



FLANGE MOUNTING (continued)

ADJUSTMENT RANGE OF REAR SUPPORT

The adjustment range of the rear support was designed by the vehicle manufacturer such that it is possible to set all attachment positions permitted by the manufacturing tolerances. This is the only way of ensuring TORSION-FREE PUMP SUPPORT ON BOTH SIDES.

FLANGE MOUNTING (continued)

ADJUSTMENT RANGE OF REAR SUPPORT

Should it not prove possible to adequately adjust the rear support when attaching the pump to the engine, this may be an indication of impermissible deviations. If dirt is not the cause of the deviation, correct attachment of the injection pump to the engine must be guaranteed by appropriate component exchange.

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

EDC IN-LINE PUMPS
WITH RE POSITIONER

Workshop: EP
06.1996
ST 0499 En

This version supersedes the 07.1995
edition.

RE positioner: General service introduction of adjusting magnet with Hi-eX bushing.

The "Hi-eX magnet" initially envisaged as per service telegram "PE..P.. with RE30, positioner conversion" only for positioners of Scania customers is now being introduced for all RE positioners.

The introduction of the adjusting magnet with Hi-eX bearing to replace the version with bronze bearing represents a tried and tested means of counteracting isolated instances of magnet failure due to bearing wear.

- Hi-eX magnets have already been introduced as standard for the positioners of several vehicle manufacturers.

FAULT SYMPTOM:

The fault symptom described in the service telegrams "PE..P..with RE 30, idle instability" and "PE..P..with RE 30, positioner conversion", namely unstable control behavior in idle and intermediate speed range, applies to a worn electromagnet armature bushing.

Bearing wear in the start of delivery actuator results in the same phenomena and also in poor emission performance.

FAULT SYMPTOM (contd.):

When performing trouble-shooting it should however be noted that the complaint "unstable control behavior" may not only be due to increased bearing wear but also to other factors such as loose crimps, damaged connectors, quantity fluctuations or defective nozzles. This is particularly true if the positioner concerned is already fitted with Hi-eX magnets.

Perform appropriate tests before disassembling positioner.

BEARING ASSESSMENT:

Testing and assessment of bearing clearance are likewise governed by the service telegrams "PE..P..with RE 30, idle instability" and "PE..P.. with RE 30, positioner conversion". Particular attention is to be paid to the notes on wear stages.

Whenever a magnet is replaced on account of bronze bushing wear, only fit magnets with Hi-eX bushing. Magnets with bronze bushing have been withdrawn.

Note: Such conversion work may however only be performed if - in the case of magnets with bronze bearing - the bearing clearance is above the permitted limit values. Magnets with permissible bearing clearance cannot be handled under warranty.

In the case of positioners RE 33 and RE 36 (control-lever pumps) both magnets are to be changed if magnet replacement is necessary, i.e. if injected-quantity magnet is defective, install Hi-eX start-of-injection magnet at the same time.

The exclusive use of Hi-eX magnets in repair situations applies to all RE positioners supplied to date:

RE 24, RE 30 (P-pumps)
RE 31 (R-pumps)
RE 33, RE 36 (H-pumps)

ADJUSTING MAGNETS AFFECTED:

Injected-qty. adjust. magnet, all pos.
RE 24, RE 30, RE 31, RE 33, RE 36:

* Invalid(bronze bearing): 3 427 210 104
* Repl. (Hi-eX bearing): 2 427 210 019
or as of start 1996: 2 427 010 036

Start-of-inj. adj. magnet, positioners
RE 33, RE 36 (H-pump):

* Invalid(bronze bearing): 2 427 210 017
* Repl. (Hi-eX bearing): 2 427 210 023
or as of start 1996: 2 427 210 027

Pay attention to following note.

Note: The Hi-ex magnets ... 019 and ... 023 indicated first as replacements will be superseded as of the start of 1996 by the versions ... 027 and ... 010 036. These are of identical design and feature the same Hi-ex bushing.

The inj.-quant. type ... 010 036 is listed as a parts set, as the securing flange is no longer screwed to the magnet and thus provided loose together with the magnet. The magnet is only to be installed together with this flange.

The new magnets are to be introduced in service once the current versions ... 019 and ... 023 have been used up.

DISTINGUISHING FEATURES OF MAGNETS:

When the positioner cover has been disassembled, the part number can be identified without magnet removal on the basis of the 3-digit number on the end face of the magnet (injected-quantity magnet: Flange area):

3-digit number	Magnet part number	Bushing
(Qty.) 102	3 427 210 104	Bronze
(Qty.) 018	2 427 210 019	Hi-ex
(Qty.) 026	2 427 010 036	Hi-ex
(Prestr.) 016	2 427 210 017	Bronze
(Prestr.) 022	2 427 210 023	Hi-ex
(Prestr.) 027	2 427 210 027	Hi-ex

**IMPORTANT ADDITIONAL CONVERSION
INFORMATION:**

The service telegram "PE..P.. with RE30, positioner conversion" retains full validity for EDC pumps/positioners for Scania, i.e. on conversion to Hi-eX magnet simultaneous conversion to "high oil level".

As regards the EDC pumps/positioners of all other vehicle manufacturers no additional conversion measures are to be performed on installing the Hi-eX magnet, irrespective of oil level.

Note: A shaft seal is fitted in the positioner-end camshaft bearing on horizontally installed EDC pumps even with "high oil level", i.e. positioner with no oil pump. This seal is not to be removed.

Positioners already converted at a Bosch service station to Hi-eX magnet must have a letter "H" stamped on them next to or on the rating plate. On factory conversion to Hi-eX magnets, positioners RE 33 and RE 36 (H-pumps) were given new part numbers (assembly number remains the same):

Posit. (bronze)	--->Positioner (Hi-eX)
0 421 890 353	--->0 421 890 359
0 421 890 354	--->0 421 890 364
0 421 890 355	--->0 421 890 363
0 421 890 362	--->0 421 890 365
- - -	--->0 421 890 357
- - -	--->0 421 890 358

IDENTIFICATION:

Following conversion to Hi-eX magnet a letter "H" is to be stamped on the positioner rating plate. (The previous stipulation "in the immediate vicinity of the rating plate" no longer applies).

WARRANTY:

The standard warranty provisions apply with no further special stipulations.

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

EP TEST SPECIFICATIONS

Workshop: EP
10.1996
ST 0530 En

Sending of EP test specifications
via KH Service Hotline

EP test specifications are regularly
updated on microcard(s) every 4 months.

This may mean that in the intervening
period Bosch Service Stations do not
have a current test specification
available.

In such cases you should make use of
your local Hotline, which is constantly
in direct contact with the central
KH test specification computer in
Germany. This ensures that products
can always be adjusted using current
EP test specifications when necessary.

The appropriate EP test-specification
sheet is passed directly (controlled
by KH EDP system) to your telefax
machine. 7 languages are currently
available.

Be sure to make mention of this
Bosch Service link in talks with your
customers as it is an important
aspect with regard to good, rapid
Diesel service.

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

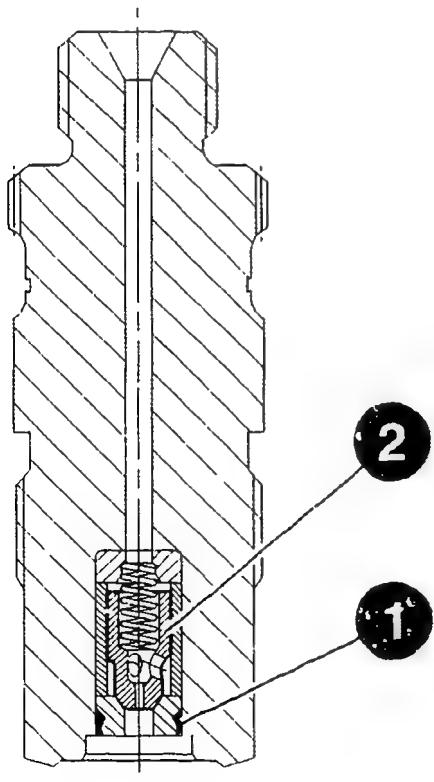
PF 33/33L PUMPS
IN KHD ENGINE BFM 1013

Workshop: EP
10.1996
ST 0529 En

Replacement of delivery-valve holders
with non-return flow control valve
on above-mentioned pumps

As a result of manufacturing modifications to the delivery-valve holder with non-return flow control valve (RDV), failures may be encountered in engine operation due to the destruction of rivet joints (1) or loose valve holders (2).

KMK07656



For this reason, the delivery-valve
holders with RDV concerned must be
replaced by new ones.

The PF pumps do **N O T** have to be
removed for this purpose.

The following assembly instructions
describe the exact conversion pro-
cedure and must be followed.

**NON-OBSERVANCE MAY RESULT IN DAMAGE TO
THE ENGINE AND PARTS ATTACHED TO IT!**

A T T E N T I O N !
THE ASSEMBLY WORK DESCRIBED BELOW IS
ONLY TO BE PERFORMED BY THE BOSCH
SERVICE STATIONS NOTIFIED BY KH/VKD2!

These assembly instructions are based
on the following tractor model:

KHD-AGRAR
A G R O T R O N 6.45 tt
with engine: BF6M 1013 E

Deviations from these instructions
may be necessary, depending on the
engine application (installation in
wheeled loader, bus, excavator, etc.).

Further information:

For safety reasons, the engine must be cold (max. 40 Grad C) when performing assembly work.

Never detach hose connections for:

- * Engine coolant
- * Heating circuit/AC
- * Hydraulic fluid

Open hood.

Disconnect battery.

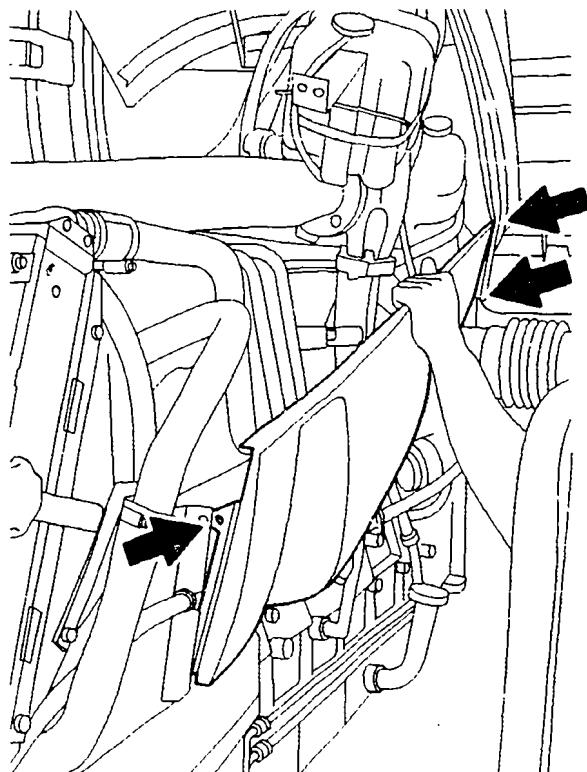
Loosen (Fig.) and screw out securing bolts of both side panels.
Remove side panels.

THOROUGHLY clean engine around PF pumps and valve cover with high-pressure cleaning system.

ATTENTION:

When doing so, never expose electrical equipment (e.g. glow duration unit) to direct high-pressure jet.

KMK07657



Loosen securing bolts of coolant expansion tank. Swivel tank towards turbocharger and secure in this position with rubber band, steel wire or the like (Fig.).

To permit swivelling, it may be necessary to remove tie bands/hose clips, which then have to be re-attached on assembly.

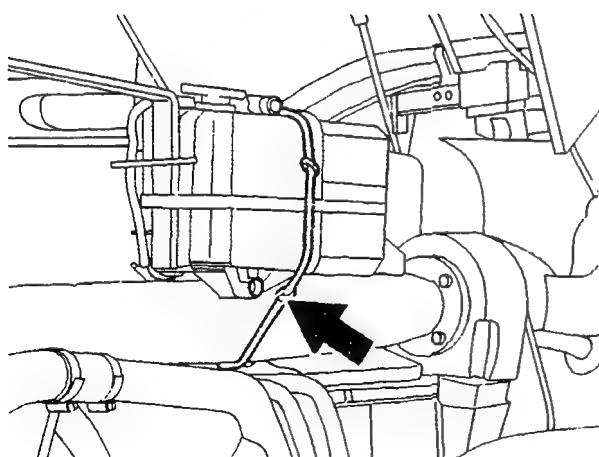
Hoses are never to be detached at tank.

Attention:

The coolant expansion tank is made of plastic.

Watch temperature of turbocharger.

KMK07658

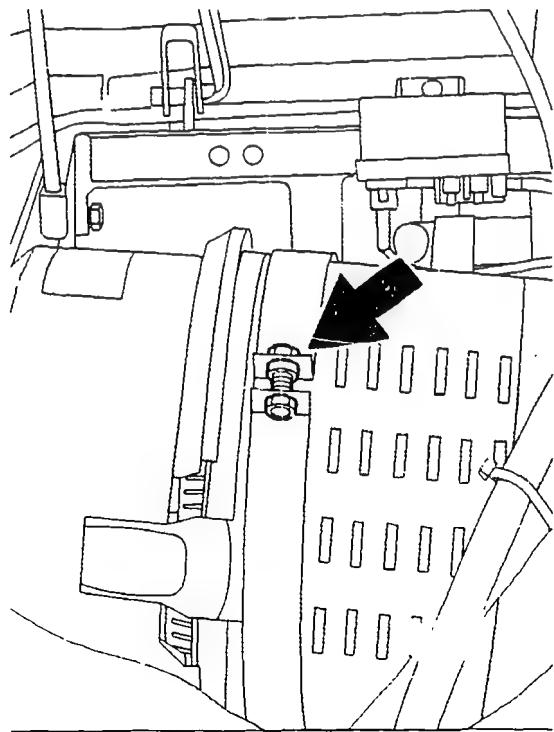


Unfasten hose clips of air inlet and outlet hose at air filter housing.

Pull hoses off air filter housing.

Loosen fastening screw of retainer (Fig.) and remove air filter housing with clip.

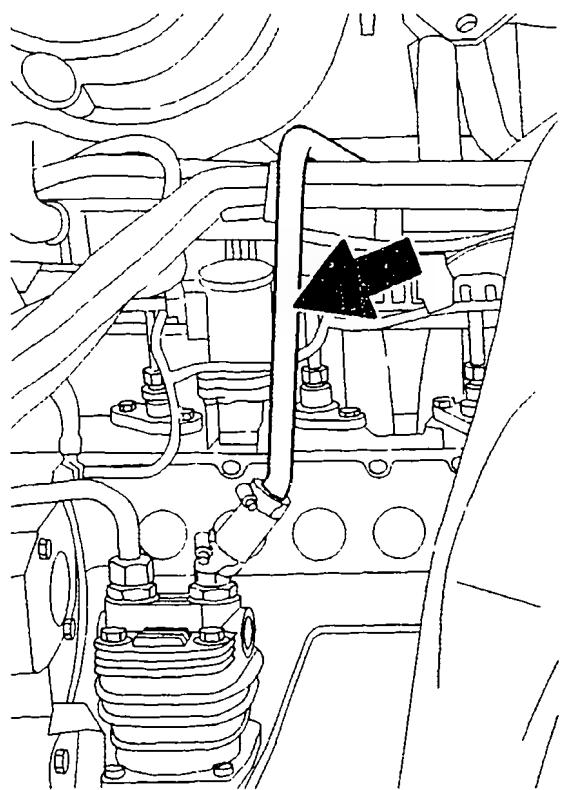
KMK07659



Detach intake line of air compressor (Fig.).

Remove hose/line fasteners impeding detachment of valve cover.

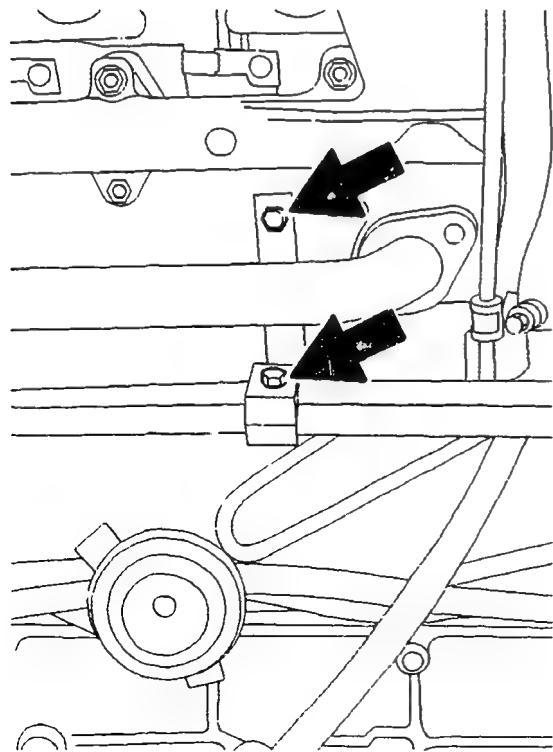
KMK07660



Unfasten line clip (on left of engine) and lay it aside.

Do not open line connections (water circuit for cab heating).

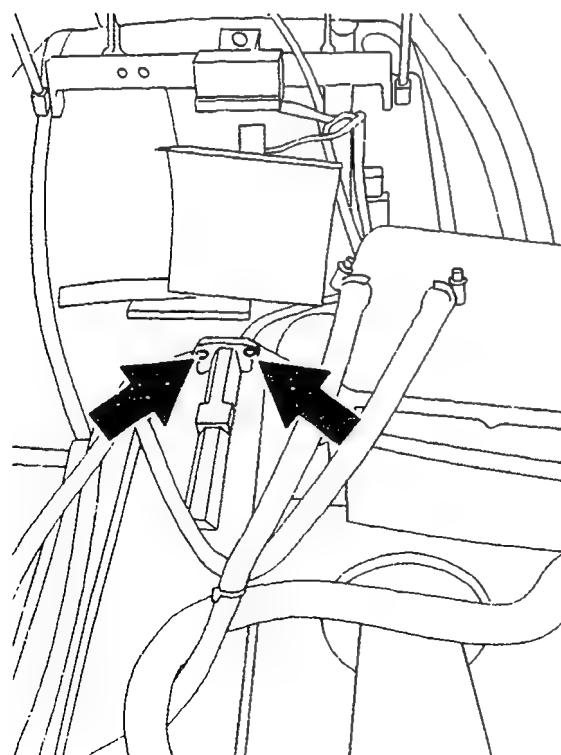
KMK07661



Loosen securing bolts of valve cover and crankcase breather (Fig.).

Carefully remove valve cover.

KMK07662

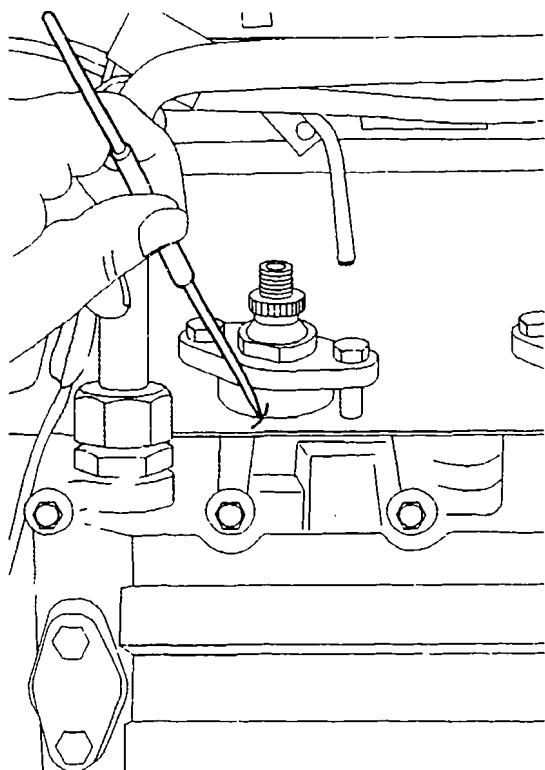


Mark each individual PF pump on side facing crankshaft housing with scriber.

This mark is used for checking possible change in installation position on subsequent disassembly/assembly of delivery-valve holder.

Remove tie bands of leakage fuel lines.

KMK07663



Unfasten cap nuts of injection tubing on pump end.

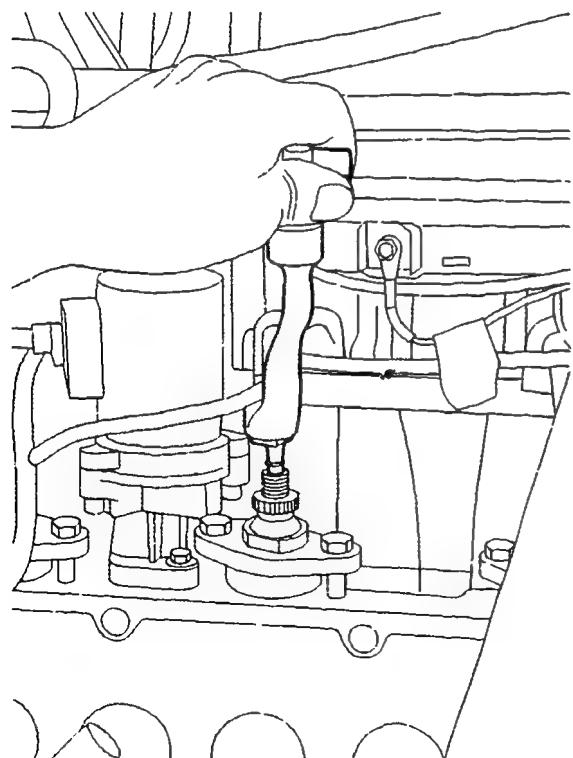
Nuts are not to be completely removed so as to stop dirt ingressing into the lines.

Use compressed air to clean cap nuts.

Then completely remove cap nuts.

Pull cable connector off shutoff solenoid and carefully release connecting cable from wire fastener.

KMK07664



Use compressed air to clean DHK seat.

Use socket wrench TORX - E10 to unfasten bolts of nozzle clamps (Fig.).

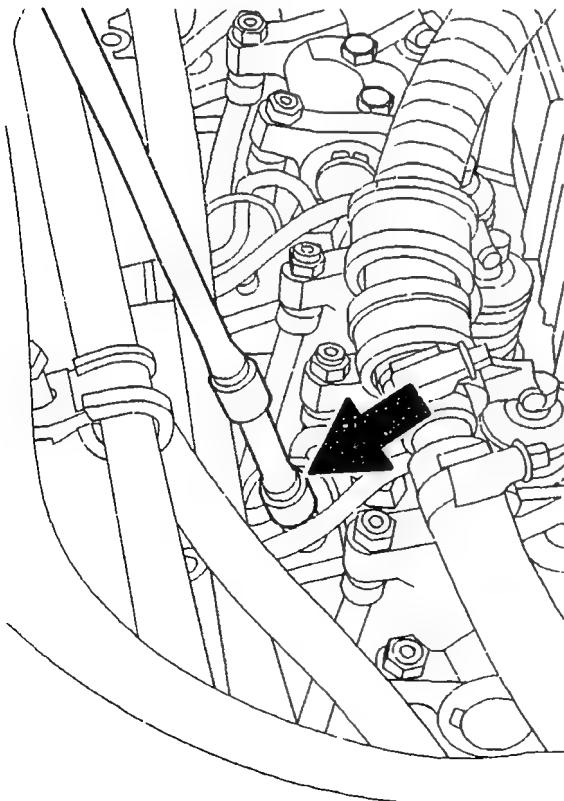
Remove bolts and nozzle clamp.

Nozzle-and-holder assemblies (DHK) remain in engine.

Note:

- * Cap nuts of injection tubing are not to be loosened at nozzle-and-holder assemblies.
- * Do not bend injection tubing.

KMK07665



Swivel injection tubing aside.

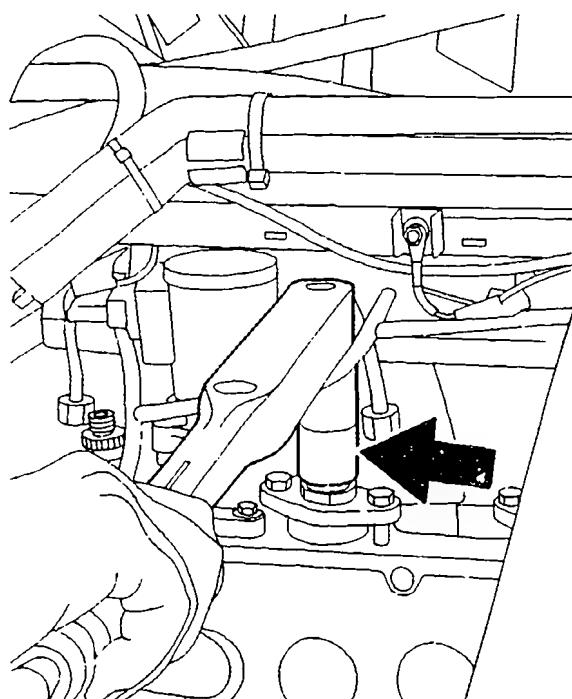
Use socket wrench 0 986 611 451 (KDEP 2986) to unfasten delivery-valve holder to the extent that O-rings do not emerge from barrel-and-flange elements.

Use compressed air to clean delivery-valve holder.

Completely screw out delivery-valve holder.

Make sure dirt does not ingress into the elements when performing the work described in the following.

KMK07666



Check on non-return flow control valves:

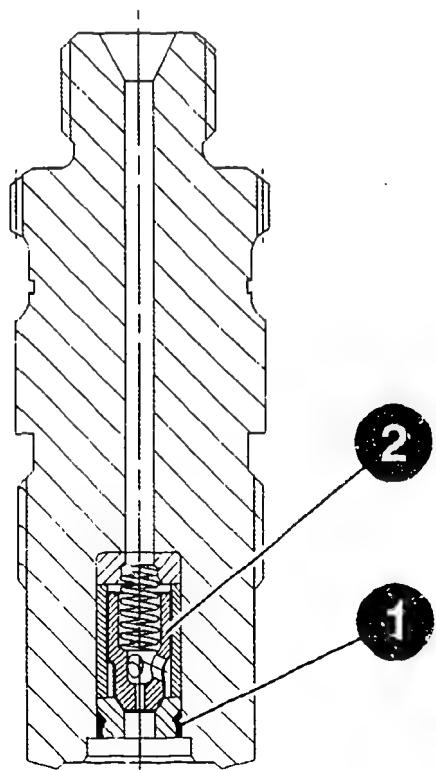
- * Loose valve holders (2) can be moved axially. This can be checked with a screwdriver.
- * Rivet joint (1) damaged or parts missing?

If valve is damaged, element must be checked for damage and pump replacement may be necessary.

In such cases, injection tubing and nozzle must also be replaced.

Pump replacement is only possible in conjunction with Deutz-Service.

KMK07656

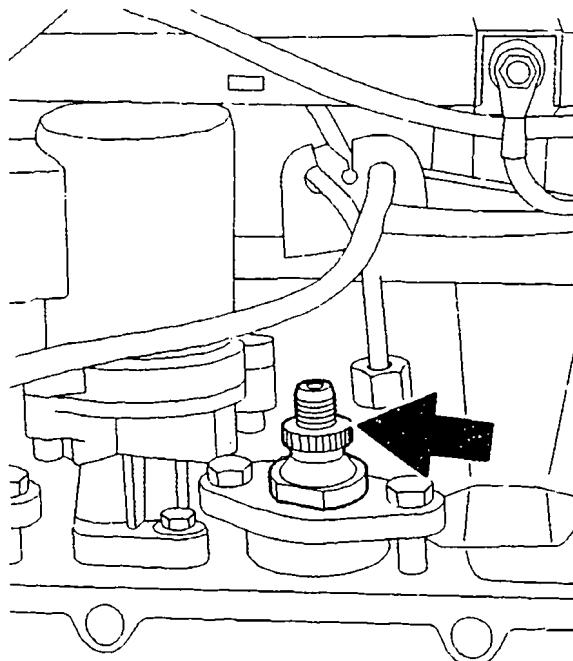


Check proper seating of O-ring before assembling new delivery-valve holders.

Immerse delivery-valve holder (gripping edge, thread and O-ring) in clean transmission oil.

Screw in delivery-valve holder (Fig.) by hand.

KMK07667



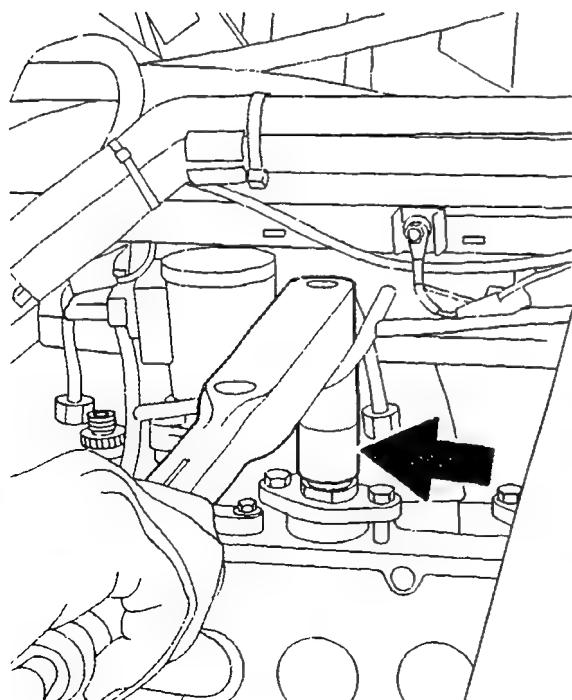
Use socket wrench 0 986 611 451
(KDEP 2986) to tighten delivery-valve
holder as follows:

- * Pretighten to 50 Nm.
- * Tighten in one operation to tightening torque of 115...120 Nm.

IMPORTANT:

After assembling delivery-valve holders always check scribe mark to see whether installation position of PF pumps has changed. If this is the case, loosen securing bolts slightly and correct position. Then tighten bolts alternately to 7 Nm - 10 Nm - 30 Nm.

KMK0766S



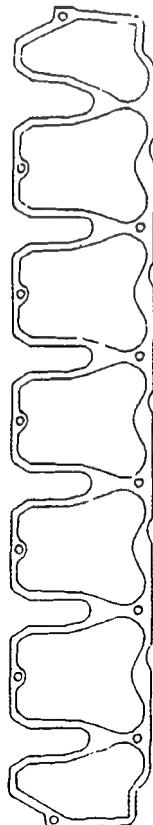
Pull nozzle-and-holder assembly out of cylinder head.

Scrap heat-absorbent washers and replace with new ones.

Fit new leakage fuel hoses if necessary.

Remove seal of valve cover and fit new seal (Fig.).

KMK07668



Re-install nozzle-and-holder assemblies in cylinder head.

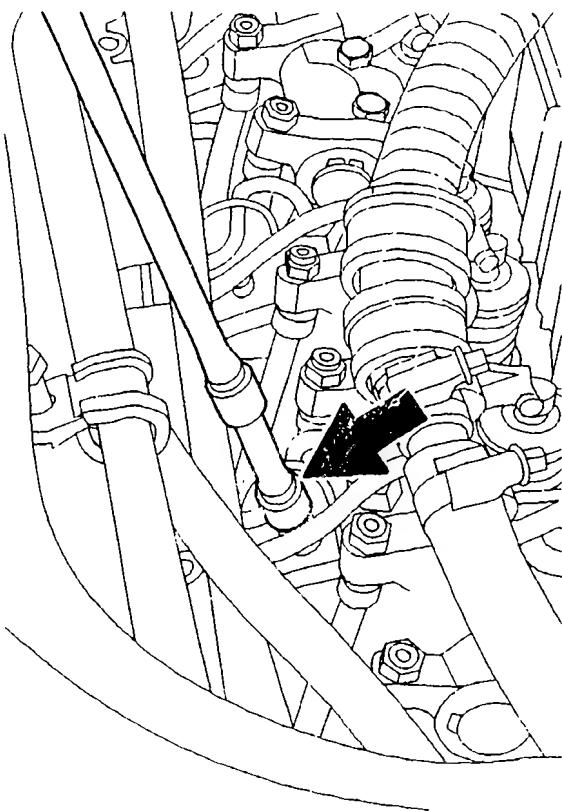
Re-attach clamps of assemblies and fit securing bolts by hand.

Screw cap nuts of injection tubing by hand onto delivery-valve holders.

Tighten securing bolts of clamps to tightening torque of 16...21 Nm (socket wrench TORX - E10 - Fig.).

Pretighten cap nuts of injection tubing to approx. 5 Nm, then perform final tightening to 30..33.5 Nm.

KMK07665



Reconnect cable connector to shutoff solenoid and engage connecting cable in clip.

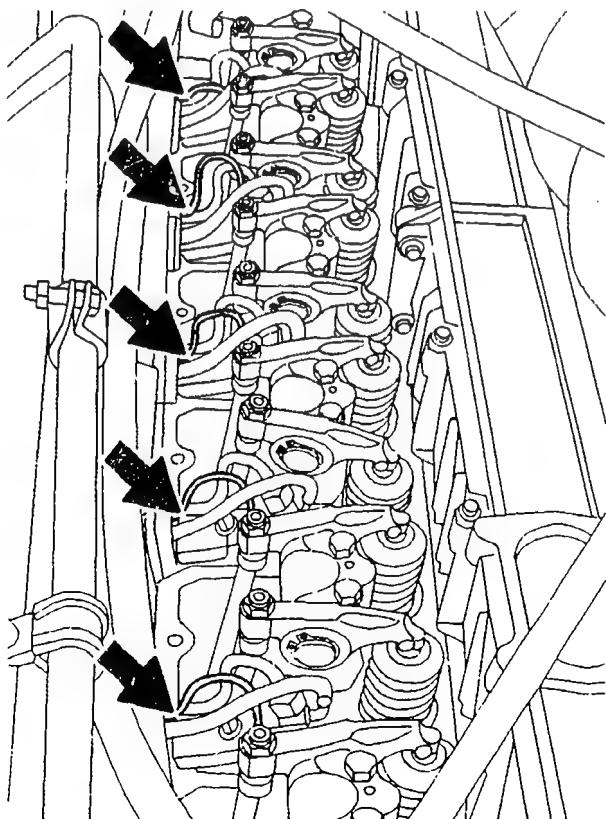
Re-attach valve cover.

WHEN INSERTING COVER, MAKE SURE THAT ELECTRICAL CONNECTIONS OF SHEATHED-ELEMENT GLOW PLUGS (FIG.) DO NOT BECOME CAUGHT/DO NOT SHEAR OFF. POSITION RUBBER SEALS CORRECTLY.

Fit securing bolts of valve cover by hand.

Then tighten bolts (working outwards) to tightening torque of 10...12 Nm.

KMK07669

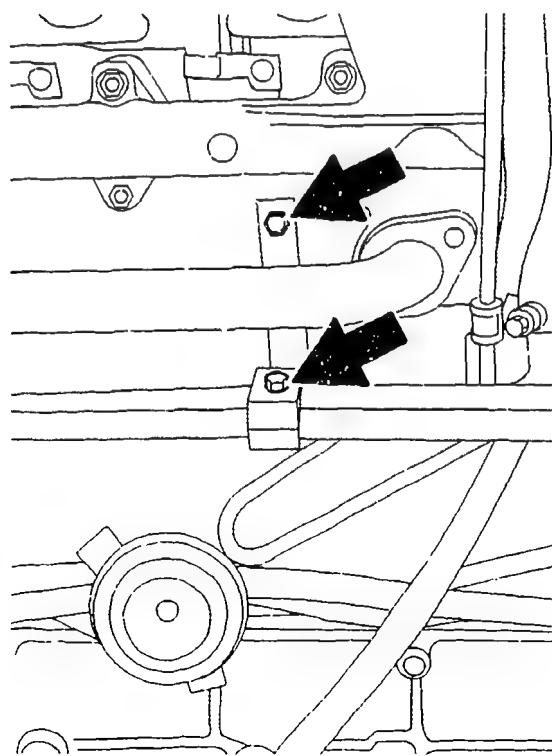


Reposition crankcase breather with O-ring and tighten securing bolts to 7.5...9.5 Nm.

Re-attach (Fig.) line clip (left of engine).

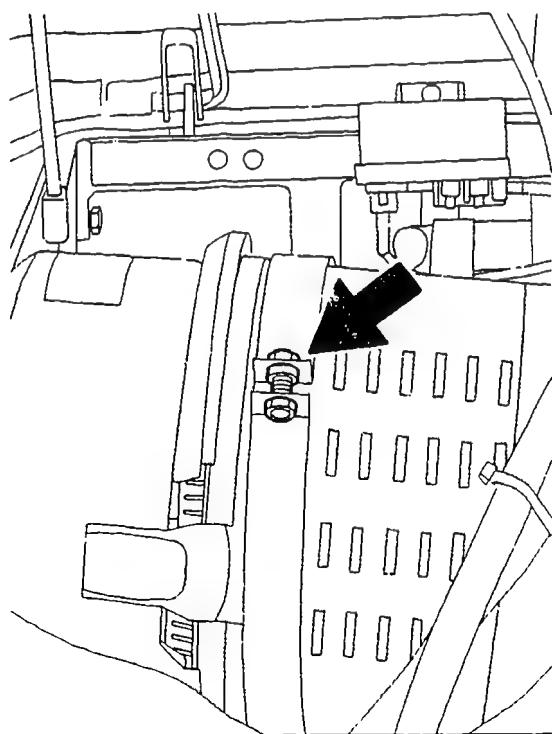
Re-attach intake line of air compressor.

KMK07661



Pre-position retainer of air filter housing and insert air filter housing. Attach air connection hose to air filter housing and fasten hose clips again. Screw in retainer fastening screw (Fig.).

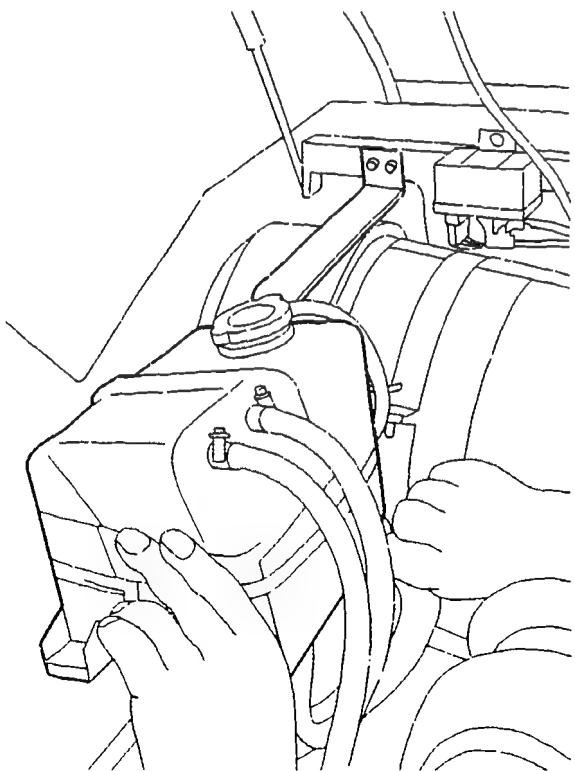
KMK07659



Re-attach coolant expansion tank
(Fig.).

Re-install all hose/line fasteners
previously detached.

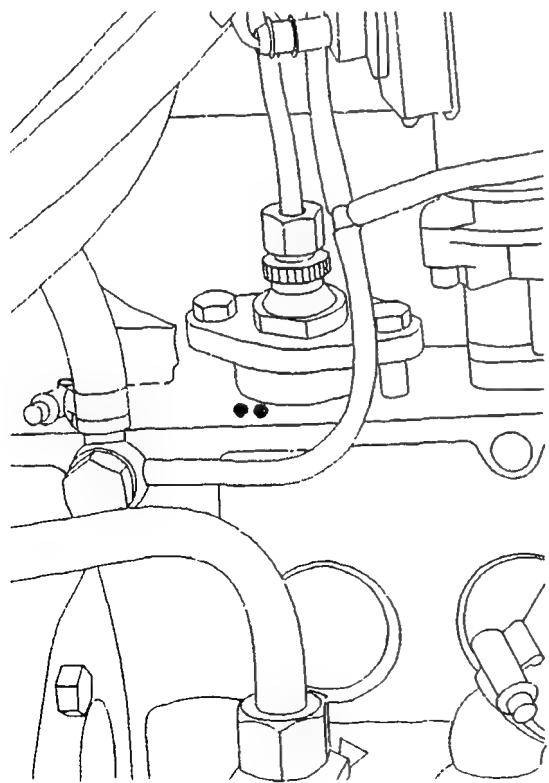
KMK07670



Two distinct center-punch marks are to be made front left next to PF pump of cylinder 1 (cylinder 1 = flywheel end).

These adjacent center-punch marks indicate conversion of the delivery-valve holders with non-return flow control valve.

KMK07671



Reconnect battery.

Start engine.

Perform trial run.

Watch out for leakage (leakage air).

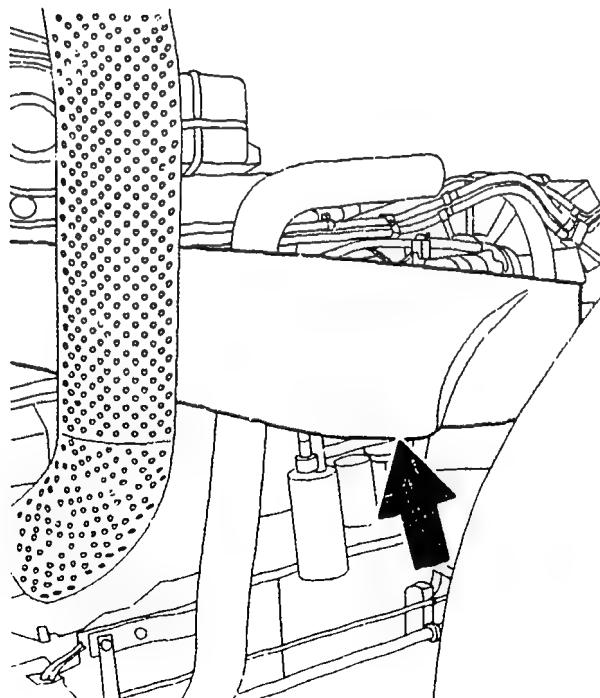
Perform final inspection after trial run.

On new vehicles, the replaced delivery-valve holders have to be repainted (with engine switched off).

Re-attach side panels (arrow).

Close hood.

KMK07672



FURTHER INFORMATION:

All parts required are contained in a conversion kit:

- * RDV delivery-valve holder
- * Valve cover seal
- * Heat-absorbent washers

Engine	Part no.
BF 4 M 1013	2 417 031 007
BF 6 M 1013	2 417 031 008

If valve cover seal is damaged on assembly, a new one must be obtained via Deutz-Service.

FURTHER INFORMATION:

Approximate time for on-the-vehicle conversion:

2 x 2 man-hours.

After conversion, complete confirmation form (see Appendix to appropriate letter from KH/VKD2).

- * 1 copy to be given to vehicle owner
- * 1 copy to be sent to
ROBERT BOSCH GmbH, Dept.: K5/QSG2
Fax No.: 0711/811-4717

For information on request for warranty coverage, see appropriate letter from KH/VKD2.

FURTHER INFORMATION:

RDV delivery valves removed are to be rendered unusable by hammering on the thread and scrapped.

The following parts can be obtained from:

PF pump, nozzle-and-holder assembly: KH/ALP

Injection tubing: Deutz-Service

Technical enquiries should be directed to your local Deutz-Service.

Published by:

Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)

Please direct questions and comments concerning the contents to our authorized representative in your country

DIESEL ANTI-THEFT PROTECT. Workshop: EP
SYSTEM (DDS1.1) FOR 10.1996
VE..F DISTRIBUTOR-TYPE ST 0531 En
FUEL-INJECTION PUMPS

Definition of voltage supply for
diagnosis and testing

The quality of the voltage source is
crucial to trouble-free operation of
the diagnosis tester KTS 300 with the
DDS1.1.

Exclusive use is to be made
of the voltage sources defined in
the safety regulations in existing
DDS instructions.

This likewise applies to the 12 V
DC output of the injection pump
test benches of series EPS 7.. and
EPS 8...

In this context, we should like to
point out that a ground connection
to the injection pump is required in
addition to the ground connection to
the DDS1.1 (except for DDS1.1-VW).

Without this connection, the ELAB has no ground connection. As a result, the ELAB does not open during the actuator test or after enabling of the DDS1.1.

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

Please direct questions and comments concerning the contents to our authorized representative in your country

DISTRIBUTOR-
TYPE FUEL-
INJECTION PUMP

Motor vehicle: FZD, NKW
Workshop: EP
10.1996
ST 0532 En

ECOLOGICAL
DIESEL FUEL WITH
LOW SULPHUR CONTENT

Diesel fuel with < 0.05 percent sulphur has been available throughout Germany and Austria since October 1995. Prescribed by law in the European Union as of October 1996.

This low-sulphur fuel liberates fewer sulphate particles and less harmful sulphur dioxide. The sulphur in the crude oil is removed by way of hydrogen treatment.

Depending on the intensity of such hydrogen treatment, the lubricating components of the diesel fuel are removed to a greater or lesser extent.

The reduced lubricity can result in increased distributor-type fuel-injection pump wear if exclusive use is made of diesel fuel without lubricating additives.

If the fuel is subjected to intense hydrogen treatment, damage may also be encountered with in-line pumps. To guarantee the lubricity of the diesel fuel with < 0.05 percent sulphur content, the leading oil companies are mixing effective lubricant additives with brand names such as SUPER DIESEL into their "normal diesel fuel" as per DIN EN 590.

Various oil companies are currently marketing diesel fuels which can produce the following phenomena with distributor-type fuel-injection pumps.

Failures and malfunctions:

- * Increased wear chiefly at cam plate and cam roller ring.
- * Rough engine running at idle and part load
- * Lack of power
- * Increased fuel consumption
- * Increased pollutant emissions

A test method and a limit value for the required lubricity have still to be defined.

Corresponding activities with regard to wear limits as per ISO and DIN Standard have been initiated

EXTREMELY low-priced diesel fuels should be treated with caution.

The addition of additives by customers is not permitted.

WARRANTY:

- Distributor-type fuel-injection pumps

Bosch will not accept warranty claims for injection-pump damage (cam plate and cam roller ring assembly) if this is clearly due to poor lubricity of the fuel.

- In-line pump:

Problematic injection pumps are to be sent to the following address.

ROBERT BOSCH GmbH

FeW / Log 3 - Auspackraum
z.W. an K5 / ERR
Am Boschwerk
70469 Stuttgart
Germany

Outside Germany, enquiries should be addressed to your local Bosch representative.

Wear patterns caused by poor fuel lubricity

- Distributor-type fuel-injection pump

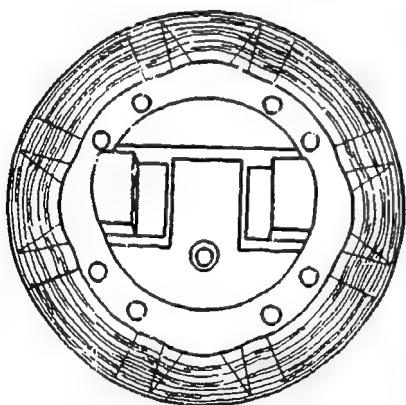
* Cam plate

Fig. a: Worn

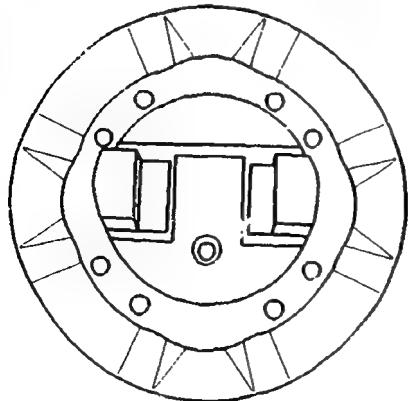
Fig. b: Not worn

KMK07914

a



b



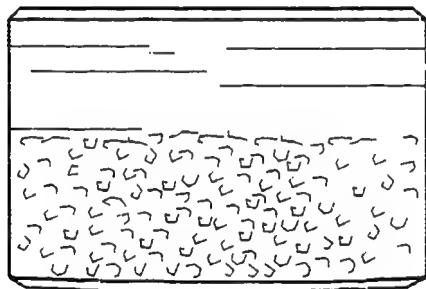
* Roller (cam roller ring)

Fig. a: Worn

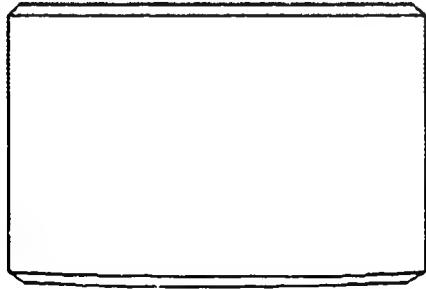
Fig. b: Not worn

KMK07915

a



b



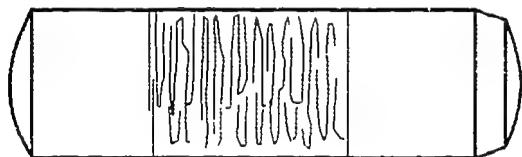
* Bearing pin (roller, cam roller ring)

Fig. a: Worn

Fig. b: Not worn

KMK07916

a



b



Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

NEW HOLLAND
COMBINE HARVESTERS

Motor vehicle: NKW
Workshop: EP
10.1996
ST 0533 En

ENGINES WITH P-PUMPS
AND RSV GOVERNORS,
FLYWEIGHT WEAR

Combine-harvester engines are often run at a constant speed for very long periods. This combined with inadequate governor lubricating-oil supply can lead to breaks in the lubricating-oil film at the flyweight bearings and thus to premature wear.

This concerns the following assemblies with date of manufacture up to FD 565:

* 0 402 076 758 and ..759
* 0 402 076 762 and ..768

As of date of manufacture FD 566 the more wear-resistant flyweight assembly 1 428 194 029 is fitted as standard.

Remedial measure:

In the event of unstable control behavior, replace the built-in flyweight assembly 1 428 194 021 with the flyweight assembly 1 428 194 029.

Following conversion, mark the governor with a "5" above the governor rating plate.

Cost accounting:

Parts used and working time involved are to be recorded on the request for warranty coverage under

- * Fault number 40 with the note
- * Flyweight wear.

This measure is restricted to 31.5.1997.

Note:

The warranty period is thus extended by max. 1 year on a goodwill basis.

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

IP ASSEMBLY
0 402 996 002
FOR SCANIA COMM. VEH.
WITH EDC

Workshop: EP
Motor vehicle: NKW
10.1996
ST 0534 En

The procedure described here only applies to the above-mentioned IP assemblies with date of manufacture 664.

Due to a pump assembly error at the factory, a situation may arise on Scania comm. veh. with this assembly where the engine is shut off by the EDC safety system. The following rectification procedure has been agreed upon with Scania.

Cause of problem:

On some pumps, the cylindrical roller bearing in the drive-end camshaft bearing-end plate was not pressed in far enough due to the use of the wrong tool. As a result, the roller cage of the bearing dips into the camshaft and impedes the return flow of oil to the engine. The inside of the pump and RE positioner may thus be completely filled with oil. This alters the dynamic behavior of the servo magnet to such an extent that the control unit detects a permanent deviation and shuts off the engine by way of the EHAB.

Procedure:

Agreement has been reached with Scania that all the pumps which may be affected are to be checked and if necessary repaired in the field.

Scania has likewise informed its workshops as to this procedure.

The pumps are to be removed and installed by Scania workshops with Bosch service stations carrying out testing and any repairs which may be necessary.

Procedure (continued):

Pressing-in the bearing to the correct depth (projection) requires use of the pressing-in tool 0 986 612 494 (KDEP 1887), which is already available to Bosch service stations offering P-pump service.

ATTENTION: As this tool does not however correspond to the prescribed press-in dimension (projection) of 13.8...14.1 mm (actual = 13.5mm), the bearing groove is to be enlarged beforehand to a depth of 14.0 mm. (This modification is necessary in any case, as the 13.5 mm dimension no longer applies).

Procedure (continued):

If no further action is taken apart from the testing described here and possible correction of the bearing press-in dimension, subsequent pump checking on an IP test bench is not necessary.

As regards all assembly operations, attention is to be paid to the repair instructions for the pump series P 8000 (microcard W-400/037).

Disassembly and assembly of the Scania drive flange on the camshaft are dealt with in the Service Info for P-pumps "Assembly, testing and adjustment information" (refer to W-400/000).

Test and pressing-in procedure:

- * Remove Scania drive flange from camshaft.
- * Remove drive-end bearing flange (bearing end plate).
Note: Raising of roller tappets is not necessary; camshaft is supported by intermediate bearing.
- * Use depth gauge to measure projection of roller bearing, i.e. distance between visible roller cage and pump contact surface of bearing end plate.
Given a correctly pressed-in bearing the set value must be 13.8...14.1 mm. Note down the measured dimension regardless of whether it is correct or not.

**Test and pressing-in procedure
(continued):**

- * If projection is excessive, use modified pressing-in tool 0 986 612 494 to press in bearing further on press as far as tool will go.
- * Check condition of bearing-end plate seals and renew if necessary.
- * Re-install bearing end plate as specified.
- * Check camshaft chamber for leaks.
- * Attach Scania drive flange to taper of camshaft. When doing so, pay attention to the above-mentioned Service Info.

Billing of job costs:

Bosch service stations are allowed a lump sum of 1.5 hours for checking/repair of each pump submitted. This will be credited in the usual warranty manner:

Please enter type of warranty GA=0, fault number FNR=30, "X" in box 80 and "R0296-SCA, ZYROLA" in the plain language box on the request for warranty coverage G 20/21.

Mark pump checked/repaired as follows: Punch "Z" on front of pump in the left area above the rating plate (or to the right of the EHAB).

Special note:

The measures described in this Service Telegram require complete recording of all pumps checked/rectified. We would therefore ask the Bosch service stations involved to provide us immediately by telephone or fax with the following information on each pump checked:

- * Pump serial number (664)
- * Measured bearing projection, corrected: yes/no

Please send the information to:
Dept. K5/QSG2 - Mr. Rösch,
Telephone 0711-811-5932, FAX ... 4717.

Published by:

Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)

Please direct questions and comments concerning the contents to our authorized representative in your country

VE..E DISTRIBUTOR-TYPE
FUEL-INJECTION PUMPS

Workshop: EP
10.1996
SI 0535 En

NOTES ON TEST-SPECIFICATION SHEET
Excess-fuel/shutoff stop

To date, the voltage values listed in the "Electrical testing" section of the test-specification sheet for VE..E distributor-type fuel-injection pumps have been as follows:

- * Excess-fuel stop 4120...4650 mV
and
- * Shutoff stop 650...850 mV

These values applied to pumps with

- * Potentiometer-type injected-quantity adjuster
and
- * Half-differential inductive pickup-type injected-quantity adjuster

The following voltage values:
* Excess-fuel stop 4120...4650 mV
and
* Shutoff stop 650...850 mV
apply with immediate effect only
to pumps with the potentiometer
type.

For pumps with the half-differential
pickup type, the values are as
follows:

* Excess-fuel stop 4000...4800 mV
and
* Shutoff stop 540...880 mV

The test-specification sheets already
published are not to be altered.
When new sheets are prepared, the
voltage values for "Excess-fuel and
shutoff stop" will be assigned in
future on a pump-specific basis.

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

DISTRIBUTOR-TYPE
FUEL-INJECTION PUMP

Workshop: EP
10.1996
SI 0536 En

PRODUCT INFORMATION,
USE OF ALTERNATIVE FUEL

This product information is intended to supplement the Service Info "Use of alternative fuel with injection components" (see W-400/000).

We would like to take this opportunity of pointing out that rapeseed-oil methylester (RME) fuel has still to be standardized/released.

The reason for this is differing RME fuel grades, which result in functional problems on account of impurities.

The impurities concerned are glycerine, glycerides und methanol.

Impurities also occur if old RME is mixed with diesel fuel.

* Effects on EDC pumps:

Sticking of adjusting shaft and timing-device solenoid-valve needle.

* Effects on mechanical pumps:

Sticking of governor due to tacky deposits on pump components, as well as impairment of NBR seals by methanol component.

Test methods for establishing the critical constituents in RME are currently being compiled. It will not be possible to standardize RME fuel until investigations have been completed.

Bosch cannot accept any warranty claims for injection-pump failure caused by non-specified RME fuel.

Furthermore, fuel samples taken in the field have revealed a high water content, which resulted in clogging of fuel filters due to the formation of mould.

Comprehensive field tests and a clear-cut definition (standardization) of the fuel are needed to obtain general release.

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

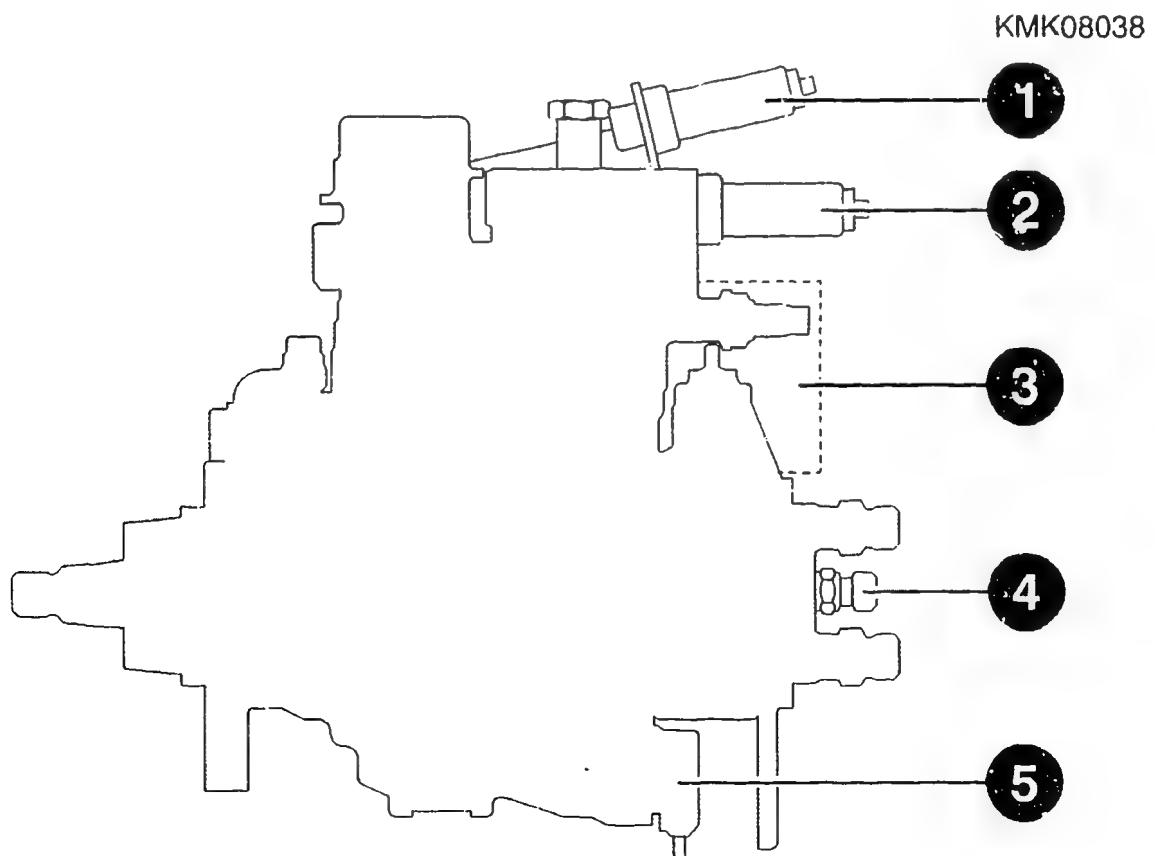
**DISTRIBUTOR-TYPE FUEL-
INJECTION PUMP VE.. F..
With DELIVERY-SIGNAL
SENSOR AND STEPPED ADA**

**Workshop: EP
10.1996
SI 0537 En**

**This Service Information deals with
repairing and testing of the
distributor-type fuel-injection
pump VE.**

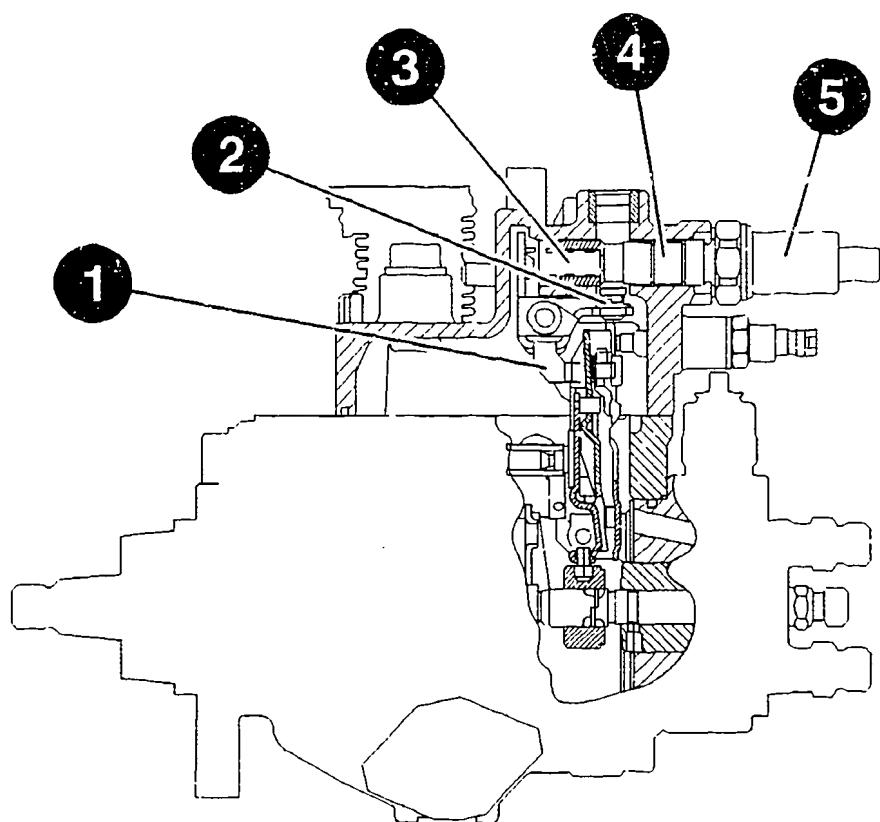
SPECIAL FEATURES:

- 1 = Temperature-dependent idle increase (TLA)
- 2 = Ambient pressure-dependent full-load stop (stepped ADA)
- 3 = Diesel anti-theft system (DDS)
- 4 = Delivery-signal sensor (FSS)
- 5 = Start-of-injection control solenoid valve



COMPONENTS OF STEPPED - ADA

- 1 = Reverse-transfer lever
- 2 = Feeler
- 3 = Return spring
- 4 = Sliding bolt
- 5 = Expansion element

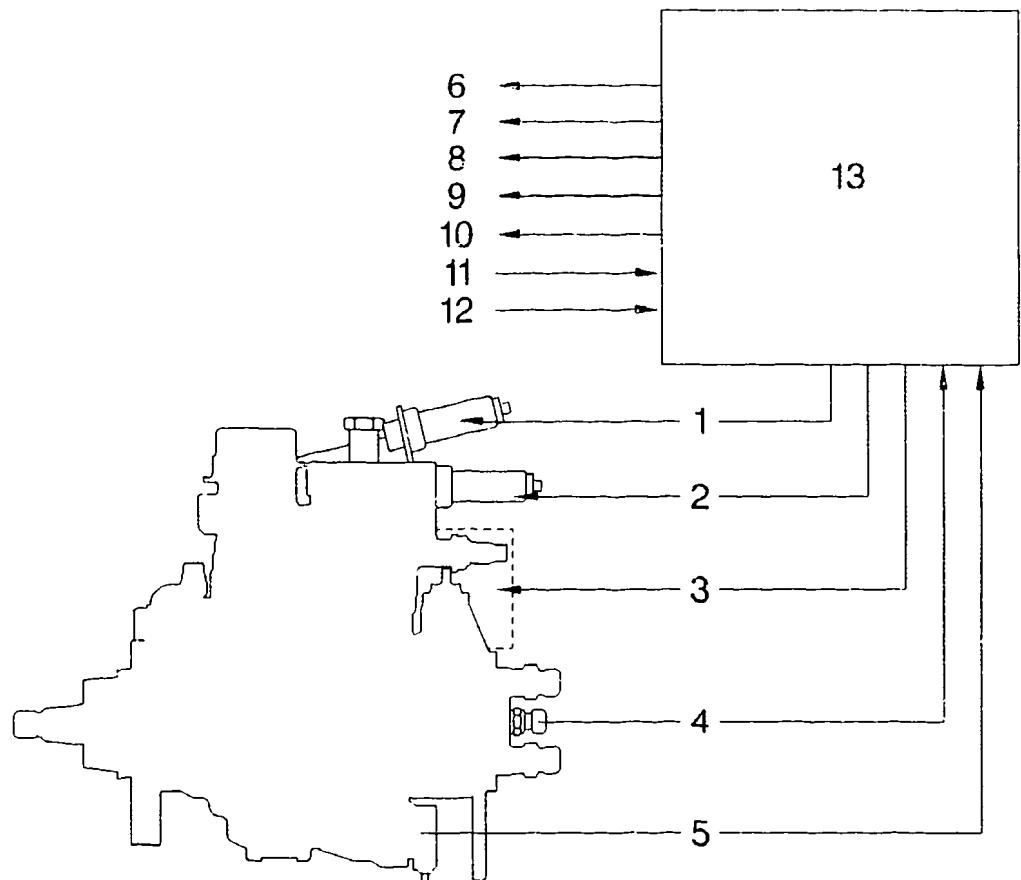


KMK08039

System layout with control unit

- 1 = Temperature-dependent idle increase (TLA)
- 2 = Ambient pressure-dependent full-load stop (ADA)
- 3 = Diesel anti-theft system (DDS)
- 4 = Delivery-signal sensor (FSS)
- 5 = Timing-device solenoid valve
- 6 = Diagnosis
- 7 = Glow-plug indicator
- 8 = Glow-plug relay
- 9 = AC
- 10 = Exhaust gas recirculation (ARF)
- 11 = Absolute pressure sensor
- 12 = Coolant-temperature sensor

KMK08040



The control unit features the following functions:

- * Exhaust gas recirculation
- * Actuation of solenoid valve on the basis of load and engine speed via delivery-signal sensor
- * Glow duration function
- * ADA function on/off

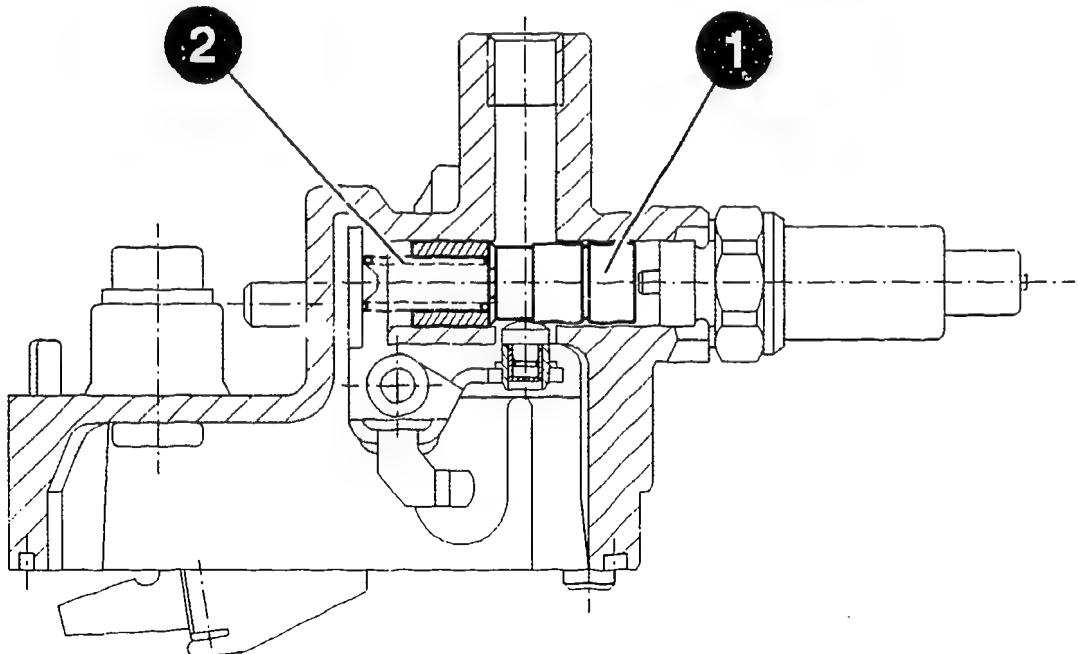
1 = Stepped piston
2 = Return spring

FUNCTION OF AMBIENT PRESSURE-DEPENDENT
FULL-LOAD STOP
* (Stepped ADA with reversing function)

In the case of an ADA with reversing function, the adjusting piston is moved in line with ambient pressure and reduces the quantity injected at full load by a fixed amount.

Full-load delivery is controlled by way of an electrically heated expansion element.

KMK08041



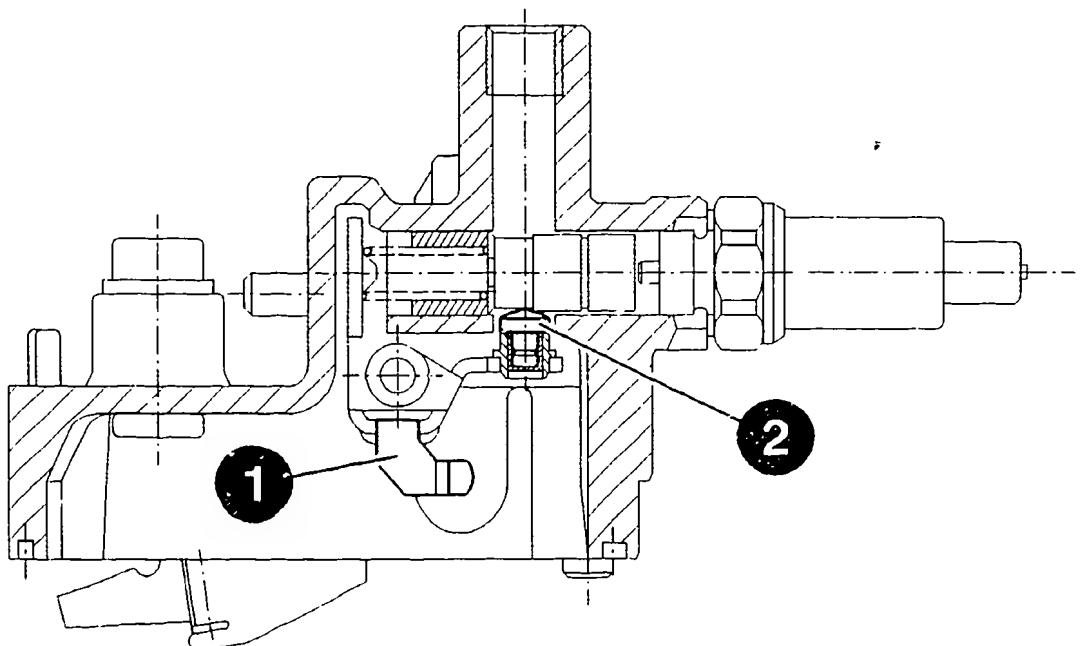
1 = Reverse-transfer lever
2 = Plug

In normal operation (altitude below 1000 m) a voltage of 12 V is applied to the expansion element via an absolute-pressure sensor in an external control unit.

This causes the adjusting piston (stepped piston) to move to the full-load position.

The reverse-transfer lever plug, which makes contact with the stepped piston, senses the control-plunger step and effects injected-quantity adjustment via the reverse-transfer lever.

KMK08042



ADA operating position
*** Reverse function**

Full-load delivery is attained when thermocouple has warmed up ($U = 12V$). Reduced delivery (ADA quantity) is attained when thermocouple has cooled down ($U = 0V$).

1 = Return spring

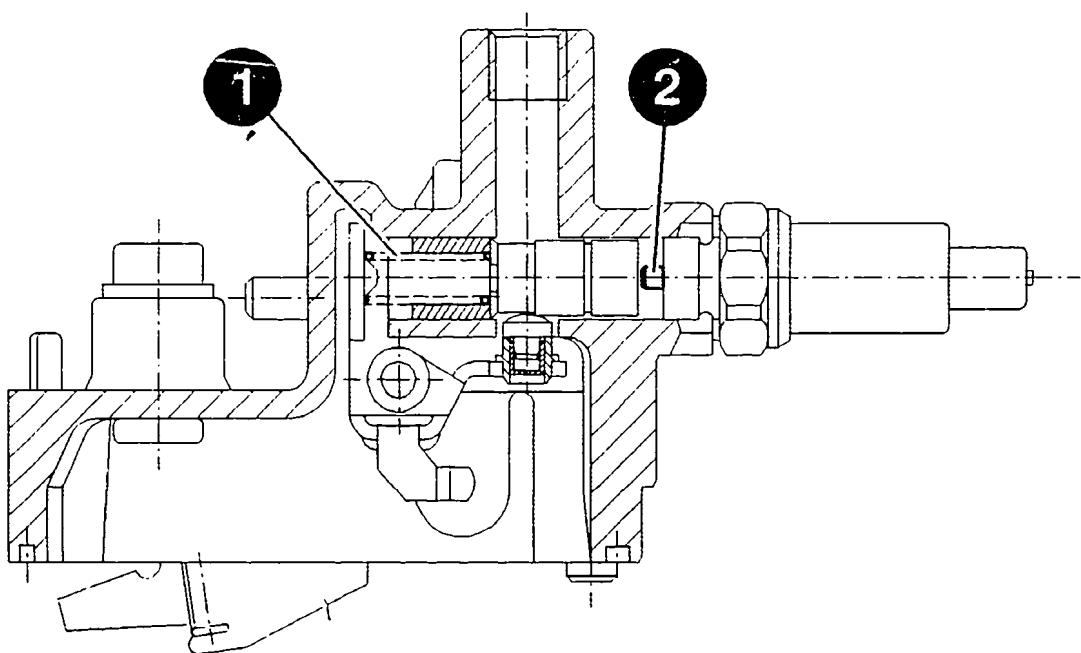
2 = Pin at expansion element

As a function of altitude, the voltage at the thermocouple is switched off and the stepped piston moved back against the pin of the expansion element by the return spring.

The reverse-transfer lever senses the control-plunger step and reduces full-load delivery by way of the fulcrum lever assembly.

In the cold-start phase, the settling time of the expansion element is approx. 2...3 min. and limits the quantity injected before the stepped piston reaches full-load position.

KMK08043



FUNCTION OF INJECTION PUMP WITH FSS

The VE equipment includes the delivery-signal sensor (FSS) with start-of-injection control as new component. The basic function corresponds to that of the mechanically governed injection pump.

Load and engine speed are determined via the delivery-signal sensor (FSS) on the basis of start-of-delivery and delivery time.

The delivery-signal sensor is screwed into the central screw plug in place of the bleeder screw.

Solenoid-valve control and EGR switch-on/switch-off are effected in the control unit via maps.

The altitude-dependent ADA function is controlled by way of an absolute-pressure sensor in the control unit.

PUMP WIRING

The pump cable connections are all located in a central connector. When removing the pump, it is to be noted that a special tool is required to press the tab contacts with offset lugs out of the central connector.

* e.g. Stahlwille

Lindenallee 27

42349 Wuppertal

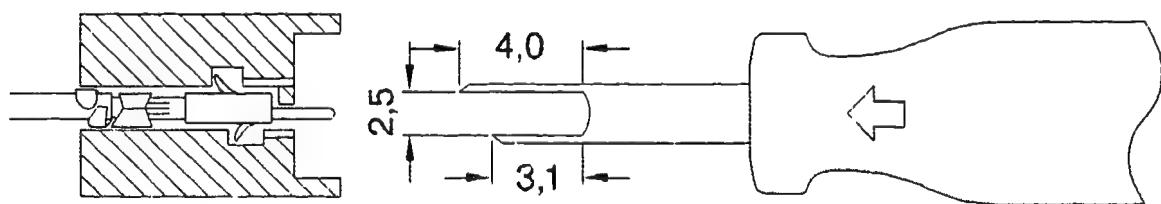
No. 1557 for blade terminal 2.8 mm

No. 1574 for blade terminal 1.2 mm

or commercially available.

Fig.: Tool for blade terminal 2.8 mm

KMK08044

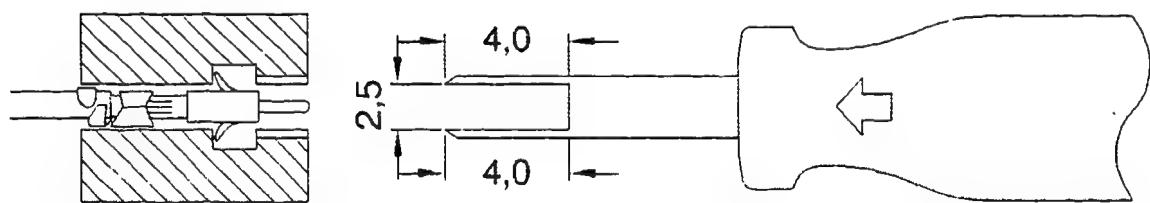


Note:

Take care when selecting tool so as not to damage contacts or housing. Release is then no longer possible or extremely awkward.

Fig.: Tool for blade terminal 1.2 mm

KMK08045



- 1 = Voltage stabilizer
- 2 = KDAW 9975
- 3 = Connector
- 4 = Solenoid timing device
- 5 = Delivery-signal sensor

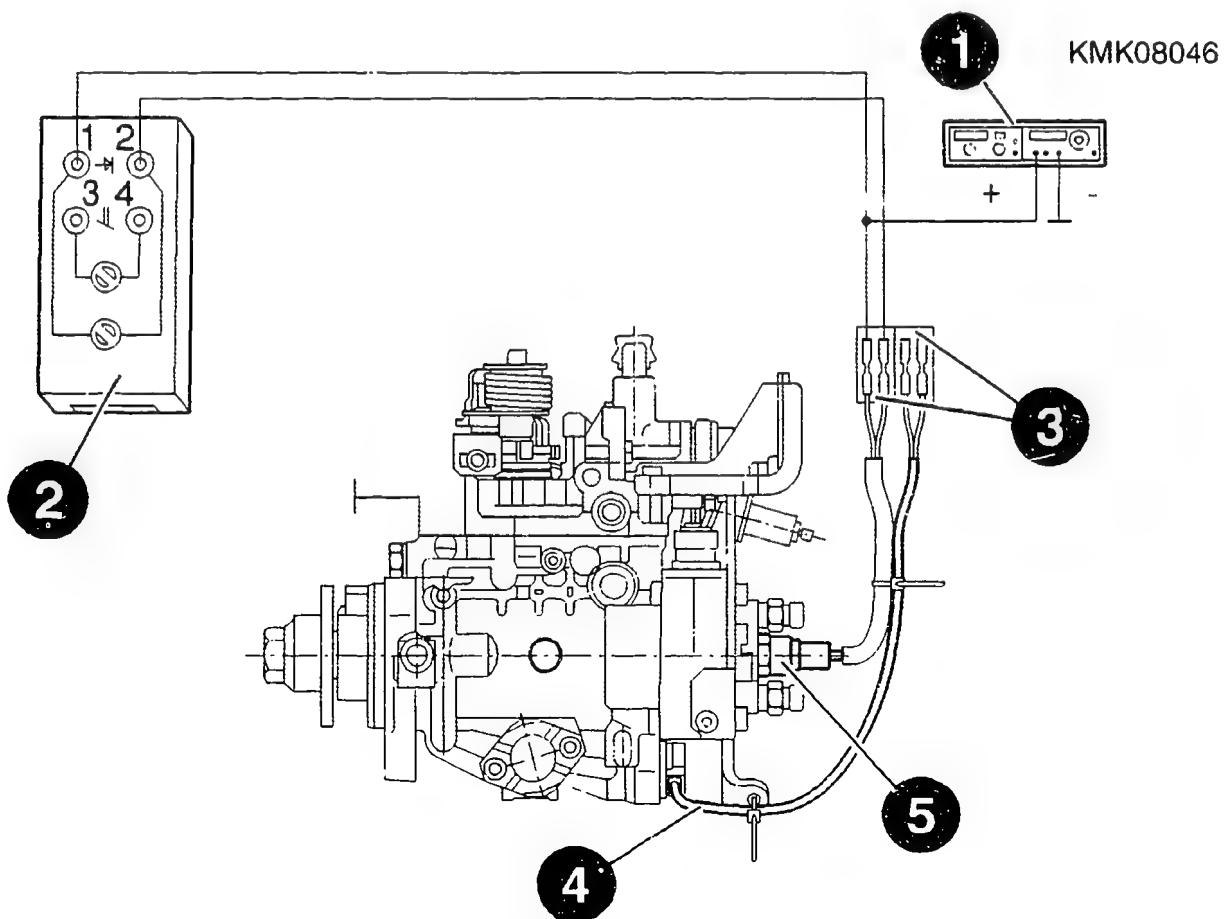
Checking delivery-signal sensor (FSS)

The FSS is checked using KDAW 9975 (0 986 619 394).

Procedure:

Connect supply voltage in parallel to white/yellow (positive) FSS plug cable and to KDAW 9975 socket 1.

Connect white/green cable to socket 2.
Set 5 VDC on voltage stabilizer.



Drive injection pump at low speed.
LED in KDAW 9975 must flash.

White/yellow = Positive
White/green = Negative

1 = Stepped piston
2 = Plug
3 = Auxiliary tool
X = Measurement position

SETTING ADA

Assemble complete ADA.

Fix stepped piston in measurement position X = 16 mm with auxiliary tool.

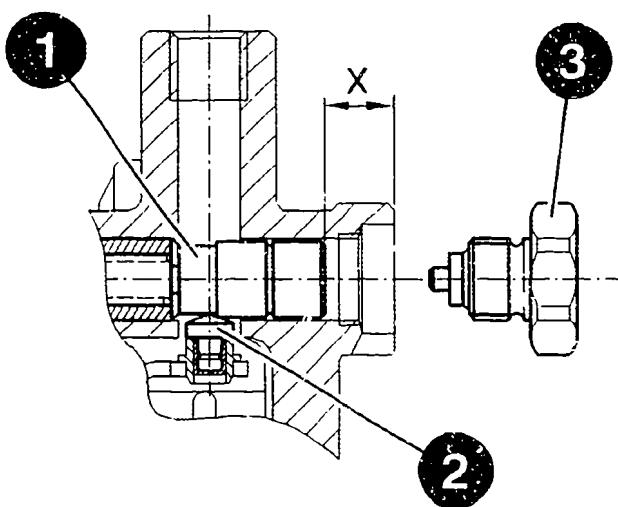
Note: Initial position = 10 mm

Position adjustment gauge

KDEP 1152/2(0 986 611 916) on ADA cover.

Use feeler gauge to measure gap between reverse-transfer lever and stop bracket of adjustment gauge. Select plug in line with size of gap.

KMK08047



1 = Measurement tool
2 = Reverse-transfer lever

* Measure reverse-transfer lever travel (dimension b)

Remove auxiliary tool.

Allow stepped piston to return to initial position.

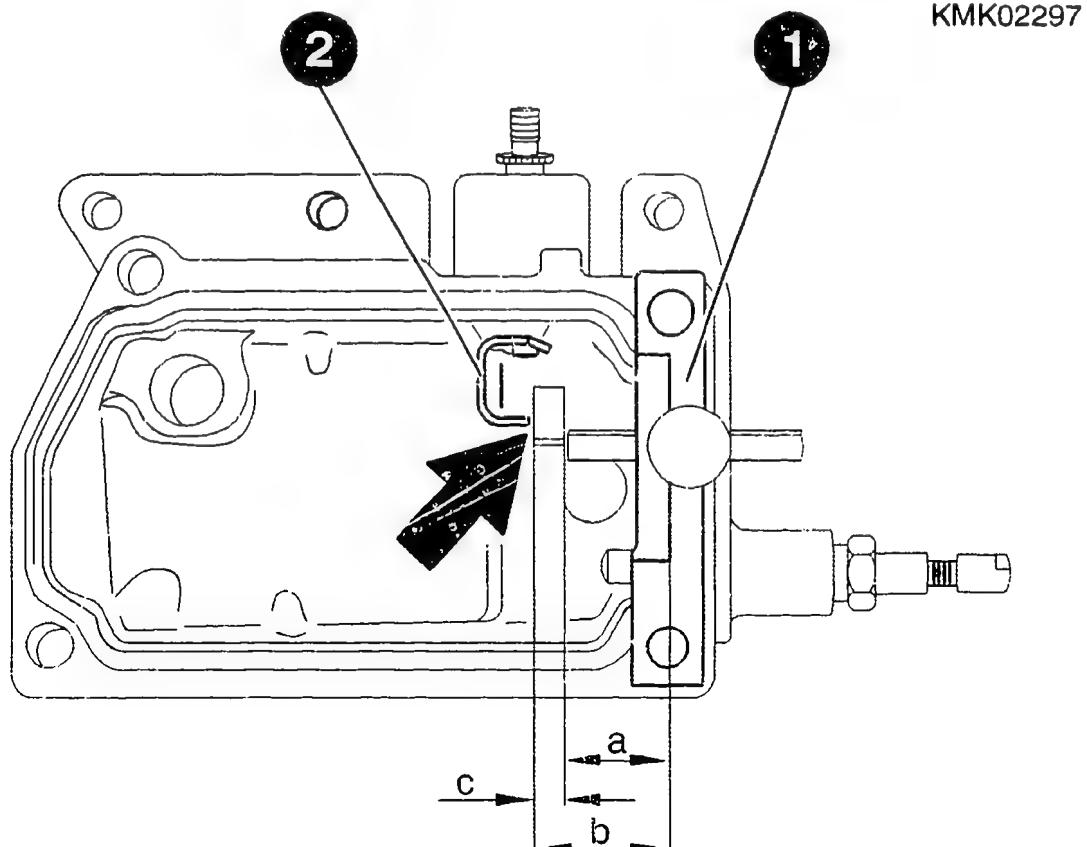
Initial position = 10 mm

Position measurement tool KDEP 1152/3 (0 986 611 917) on housing cover.

Press slide caliper (arrow) against reverse-transfer lever.

Determine thickness of slide caliper. Calculate dimension b = (c + a).

Note: Fig. = Block diagram



Difference between the two measured values "Measurement position/initial position" must be within set value tolerance (0.3 mm).

If not, check:

- * Freedom of movement of stepped piston and
- * Reverse-transfer lever
- * Correct ADA assembly and
- * Plug contact at stepped piston

CHECKING ADA FUNCTION

Prerequisite:

Thermocouple fitted.

Apply voltage to thermocouple at least 2.5 min. before start of measurement.

NOTE:

If voltage interrupted for more than approx. 12 s, apply voltage to thermocouple for 2.5 min. before next measurement.

*TEST SEQUENCE

Check/adjust full-load delivery.
Note down delivery.

Disconnect voltage supply at
thermocouple.

Cooling time between disconnection
of voltage and ADA quantity measure-
ment must be at least 2.5 min.

Determine quantity difference between
thermocouple with voltage and
thermocouple without voltage.

* Set value = -3.0...3.6 cm³/1000 S.

If set value is not attained:

- * Check freedom of movement of
stepped piston
- * Check function of thermocouple

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

DISTRIBUTOR-TYPE
FUEL-INJECTION PUMP
VE..F..

Workshop: EP
10.1996
ST 0538 En

Leakage at timing-device cover

With DI-VE pumps leakage occasionally occurs at the pressure end of the timing-device cover.

Reason:

Cavitation at O-ring beneath timing-device cover.

To avoid cavitation at the timing-device O-ring a stronger timing-device cover with part no. 1 461 074 327 is to be fitted.

VE..F.. pumps affected:

0 460 414 073
0 460 414 074
0 460 414 075
0 460 414 083
0 460 414 085
0 460 414 086
0 460 414 089
0 460 414 107
0 460 414 108
0 460 414 113
0 460 414 119
0 460 414 123

The service-parts lists for the pumps concerned are being altered.

Note:

Firmer tightening of the timing-device cover cannot eliminate the leak. Retightening is therefore not to be carried out in the event of leakage.

Warranty:

The standard warranty provisions apply.

Published by:

Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)

Please direct questions and comments concerning the contents to our authorized representative in your country

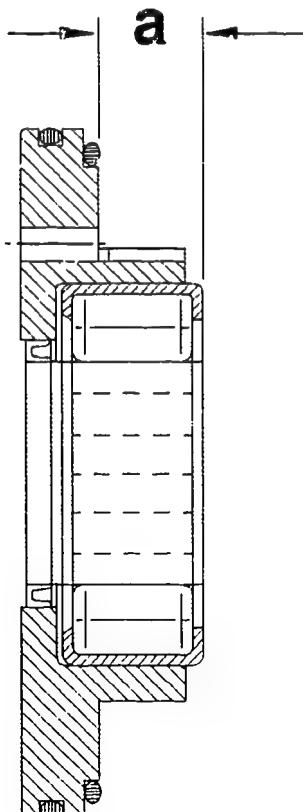
FUEL-INJECTION PUMPS
SERIES P, R and H

Workshop: EP
02.1997
ST 0539 En

CYLINDER ROLLER BEARING -
DRIVE END

When pressing a new cylinder roller bearing into the drive-end bearing cap, it is extremely important to comply with the pump-specific pressing-in depth (projection, see Fig., dimension a). Non-compliance with the pressing-in dimension can result in injection-pump malfunction and premature wear.

KMK08050



The pressing-in tools for cylinder roller bearings are designed such that the correct pressing-in dimension results automatically. To date, the following pressing-in tools are available:

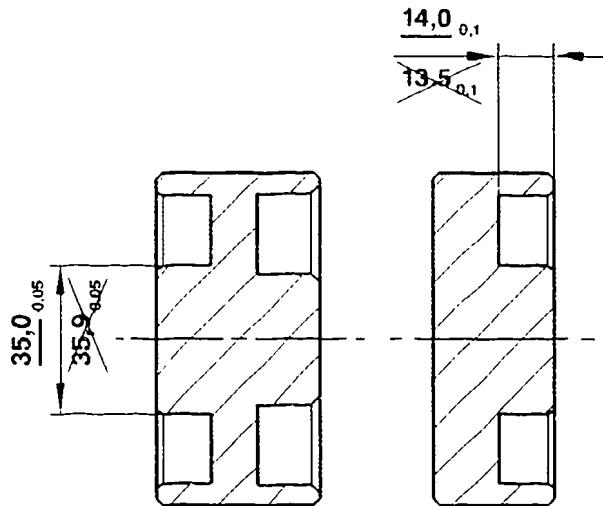
0 986 612 064 (KDEP 1551) - P-pumps
0 986 612 494 (KDEP 1887) - P-pumps
0 986 612 659 - R-pumps

The current diversity of P-, R- and H-pumps is no longer covered by these tools. The entire system has therefore been revised, dimensions standardized and the following procedure established.

Pressing-in tools:

- * The pressing-in tools 0 986 612 064 and ...494 are being modified. These modifications are of a minor nature and can be implemented on existing tools at Bosch Service Stations as shown in the illustration. The no longer valid dimensions have been crossed out and are to be machined to the new underlined value.
- * The tool 0 986 612 659 does not have to be changed.
- * A new tool, part no. 0 986 612 655, is additionally required.

KMK08051



0 986 612 064

0 986 612 494

Pressing-in tools (continued):

To ensure that users employ the right tool for the right pump, all tools will feature not only the part number, but also additional labelling indicating pump series and relevant dimensions.

Tools already in use at Bosch Service Stations should also be provided with this labelling in line with the following data.

The appropriate version of new tools will be supplied in future ex-store.

Pressing-in tools - assignment:

* 0 986 612 064 (KDEP 1551):

- Labelling: P 7000...
P 8000...
15.2 mm/dia.: 30.7 mm
- Usage: P 7100, P 7800,
P 8000, P 8500 with
30 mm taper.
Press.-in dim. 15.2 mm,
for bearing ID
(camshaft) 30.7 mm.

**Pressing-in tools - assignment
(continued):**

*** 0 986 612 064 (KDEP 1551
(continued):**

- **Labelling:** P 7000...
P 8000...
15.2 mm/dia. 35.9 mm
- **Usage:** P 7100, P 7800,
P 8000, P 8500 with
35 mm taper.
Press.-in dim. 15.2 mm,
for bearing ID
(camshaft) 35.9 mm

**Pressing-in tools - assignment
(continued):**

*** 0 986 612 494 (KDEP 1887):**

- **Labelling:** P 8000, P 8500,
14 mm/dia. 35.0 mm
- **Usage:** P 8000, P 8500 with
35 mm taper.
Press.-in dim. 14.0 mm,
for bearing ID
(camshaft) 35.0 mm

**Pressing-in tools - assignment
(continued):**

*** 0 986 612 659:**

- **Labelling:** R
15.2 mm/dia. 35.9 mm
- **Usage:** Pump size R with
35 mm taper.
Press.-in dim. 15.2 mm,
for bearing ID
(camshaft) 35.9 mm

**Pressing-in tools - assignment
(continued):**

*** 0 986 612 655:**

- **Labelling:** H
15.8 mm/dia. 35.0 mm
- **Usage:** Pump size H with
35 mm taper.
Press.-in dim. 15.8 mm,
for bearing ID
(camshaft) 35.0 mm

**Pressing-in tools - assignment
(continued):**

*** 0 986 612 655: (continued):**

- **Labelling:** R, H
15.8 mm/dia. 41.9 mm
- **Usage:** Pump size R, H with
40 mm taper.
Press.-in dim. 15.8 mm,
for bearing ID
(camshaft) 41.9 mm

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

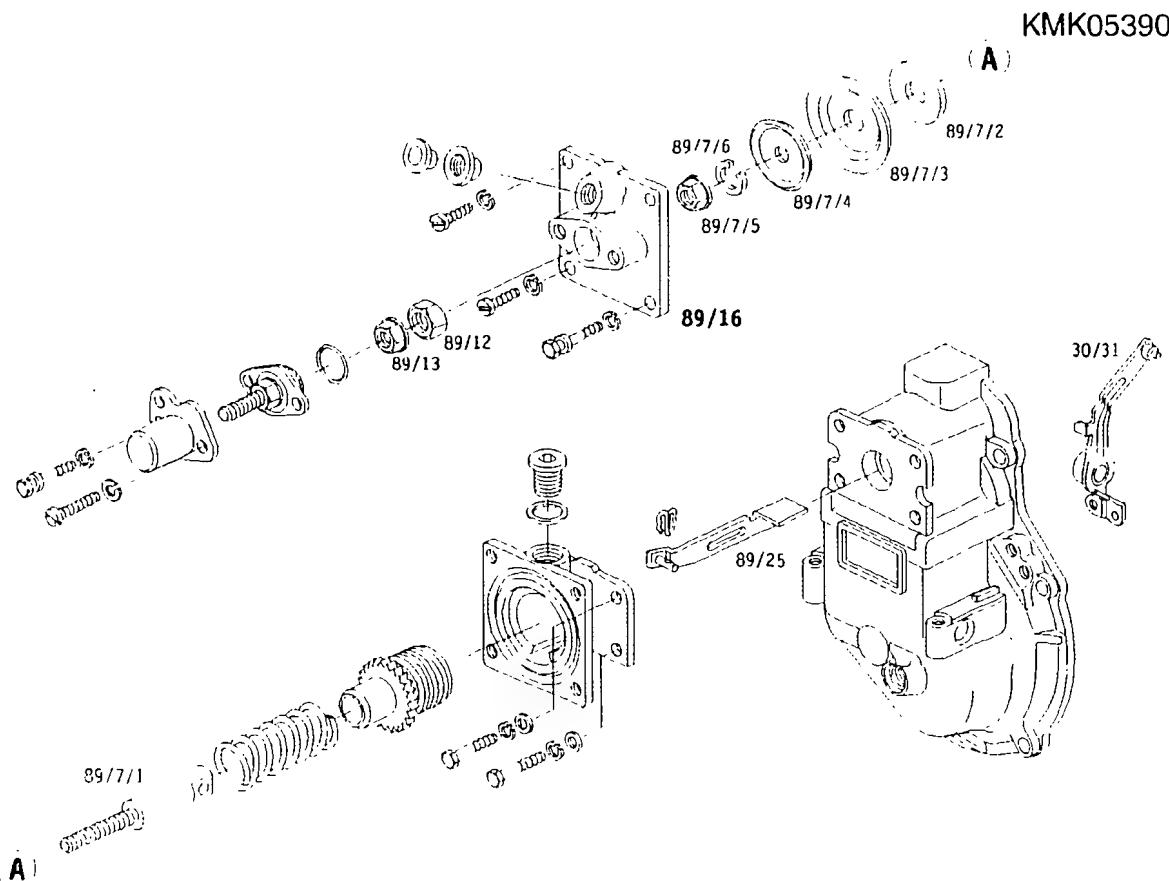
**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

EP GOVERNOR 042

Workshop: EP
02.1997
SI 0541 En

LDA conversion RQ, RQV

Due to the conversion of the LDA lifting rods from M6 to M8x1 thread, the following procedure is to be adopted when performing repairs:



(A)

Case 1

Replacement of entire LDA

Bracket item 89/25 with pin diameter 5 mm is retained from old LDA (remove new bracket supplied with new LDA). If pin diameter of old bracket is 4 mm, bracket 2 421 335 021 with pin 5 mm must be fitted.

Case 2

Replacement of bracket item 89/25 with pin diameter 4 mm

Entire LDA must be renewed if bracket is defective. Bracket supplied with LDA must be replaced with bracket 2 421 335 021.

Case 3

Renewal of LDA lifting rod
(item 89/7/1)

Old lifting rod with M6 thread is
being replaced by lifting rod with
M8 thread.

This involves renewal of items

89/7/2 washer 89/7/4 washer

89/7/5 nut 89/7/6 lock washer

89/7/3 diaphragm

89/12 rd. neck nut 2 423 315 011 (M8x1)

89/13 slotted nut 2 420 360 005 (M8x1)

89/16 stop cover.

Old bracket 89/25 with 5 mm pin
diameter must be retained.

If pin diameter of old bracket is

4 mm, use must be made of bracket

2 421 335 021 with 5 mm pin.

Case 4

Renewal of stop cover
(item 89/16)

Stop cover is now only available with
large through-hole.

When repairing LDA with lifting-rod
thread M6, use is to be made of new
round-neck nut with enlarged collar
item 89/12 part no. 2 423 315 012 (M6).

Published by:

**ROBERT BOSCH GMBH
Division KH
Technical After-Sales Service
(KH/VKD 6)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

**DISTRIBUTOR-TYPE
FUEL-INJECTION PUMPS 046**

**Workshop: EP
02.1997
SI 0542 En**

Cam roller ring

**The following changes have been made to
the cam roller ring of the VE pumps:**

Roller:

Old 8 mm wide, new 7.7 mm wide

Bushing:

Old 8 mm wide, new 7.6 mm wide

Spring seat:

Old 1.2 mm thick, new 1.5 mm thick

**Care is to be taken to ensure that
roller and bushing with a width of
8 mm are not installed together with
a 1.5 mm thick spring seat on the same
bearing pin.**

**Other types of mixed installation are
permitted.**

Published by:

**ROBERT BOSCH GMBH
Division KH
Technical After-Sales Service
(KH/VKD 6)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

Cam plate/Distributor head
alteration to driver pin

On various VE-pumps the driver pin in the cam plate was increased in thickness during production from 3.5 mm to 4.0/4.4 mm. This modification simultaneously led to the introduction of a new distributor head with a different piston base.

In the appropriate service parts lists this alteration to Item 29 cam plate is marked -> FD (to) and FD -> (from). The same applies to the distributor head, Item 50.

ATTENTION:

If the old distributor head is ordered the new one is supplied automatically. Before ordering the distributor head, the driver pin of the cam plate must therefore be measured. If the pin diameter is 3.5 mm, the new cam plate must likewise be ordered in addition to the distributor head.

Published by:

**ROBERT BOSCH GMBH
Division KH
Technical After-Sales Service
(KH/VKD 6)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

INJECTION-PUMPS
P 7100

Workshop: EP
02.1997
SI 0544 En

General introduction of
lobe-type roller tappet
for P 7100

All roller tappets 2 418 750 022
given in service-parts lists
under item 47 are being replaced by
2 418 750 062.

The new roller tappet does not feature
item 48 - pressure plate 2 410 251 001
in the service-parts list. It remains
valid for service purposes.

When performing repairs, it is
permissible to combine old and
new roller tappets.

Published by:

**ROBERT BOSCH GMBH
Division KH
Technical After-Sales Service
(KH/VKD 6)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

VE PUMP

Workshop: EP
02.1997
SI 0545 En

Discontinuation of inner chamfer on
pressure springs in delivery-valve
holder

The inner chamfer is being discontinued
on all pressure springs in the
delivery-valve holder; part no. remains
the same.

When replacing pressure springs, make
sure that new springs without an inner
chamfer are only installed with
delivery valves where the valve cone
features a recess at the spring guide
diameter.

Delivery valves with no recess in the
spring guide diameter (manufactured
before 1983) must be replaced if
necessary.

Published by:

**ROBERT BOSCH GMBH
Division KH
Technical After-Sales Service
(KH/VKD 6)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

EDC IN-LINE PUMPS
WITH RE POSITIONER

Workshop: EP
02.1997
SI 0547 En

Test instructions

As indicated in all test and adjustment instructions for EDC in-line pumps, the test equipment includes one 12 V/15 A and one 12 V/3 A stabilizer each.

The specifications given for the stabilizers stipulate the minimum requirements to be heeded when selecting suitable commercially-available equipment.

Frequent Service Organization enquiries have shown that despite the details given, there is uncertainty about which devices to purchase. To avoid such enquiries in the future, please heed the following additional information.

Note: Due to the wide range of equipment available on the world market, we shall be continuing our practice of not giving any specific purchase recommendations.

When choosing a suitable commercially-available device, please give consideration to the tasks to be performed, which are described in detail in the appropriate test instructions.

Stabilizer 12 V/15 A:

As variable current source, this is used exclusively for infinite adjustment of injected-quantity solenoid/rack between start and shutoff position. Accordingly, it must be possible to vary the current output of the stabilizer between 0 A and max. current, i.e. it must be "adjustable".

Stabilizer 12 V/15 A (continued):

The stabilizer is thus used to assist precision adjustment of the rack against the considerable force of the rack return spring on EDC pumps. This function does not require the stabilizer to be highly accurate, as fine rack adjustment for the individual measurement points is performed by hand - as described in the instructions - in line with rack travel or U/act. voltage.

Stabilizer 12 V/3 A:

This is used as voltage supply for the test control unit for which 12...14 V DC is stipulated. The 3 A quoted is a minimum requirement; the actual current input is determined by the tester. This function can also be assumed by a well-charged 12 V battery.

Both devices must of course supply a smoothed DC voltage.

We believe that the above information will ensure that no problems are encountered when purchasing appropriate equipment.

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

**DISTRIBUTOR-TYPE
FUEL-INJECTION PUMP
VE..F..
WITH STEPPED LDA**

**Workshop: EP
02.1997
SI 0548 En**

**This service info is designed to
supplement the repair instructions for
VE-pumps on microcard W-400/.. with
LDA.**

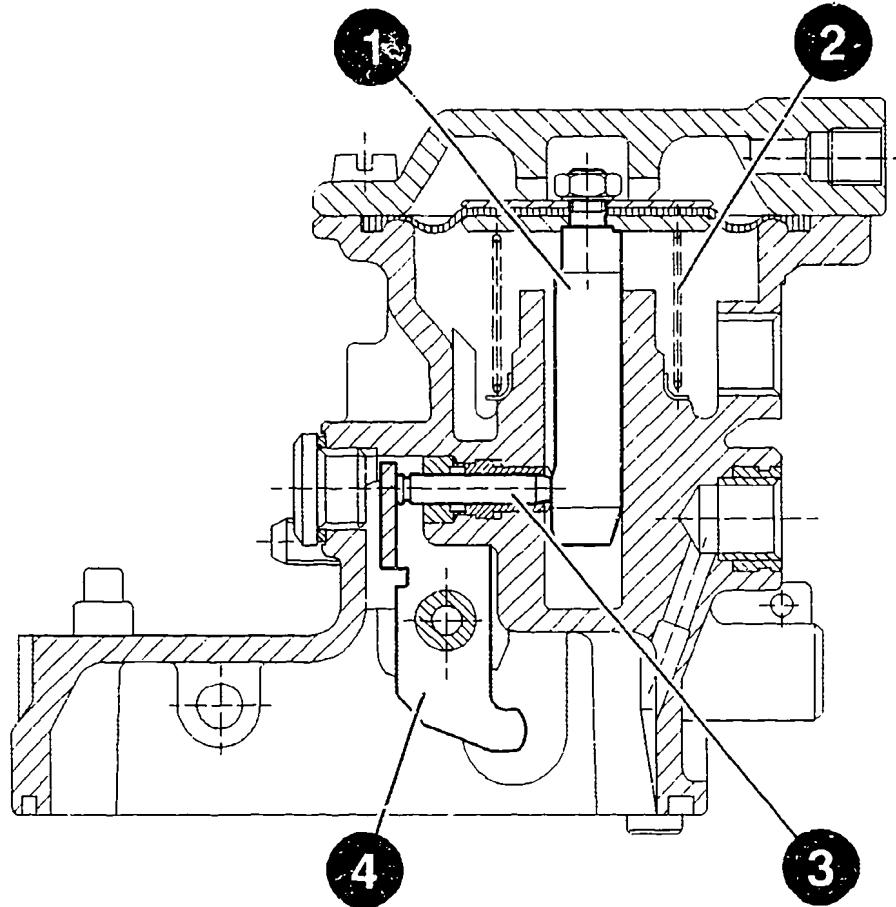
**As of the introduction of the stepped
LDA the following adjustments no
longer apply:**

- * Adjustment of intake volume**
- * Adjustment of spring pretension**
- * Adjustment of LDA stroke**

COMPONENTS

- 1 = Adjusting pin with stepped area
- 2 = LDA spring
- 3 = Guide pin
- 4 = Reversing lever

KMK08275

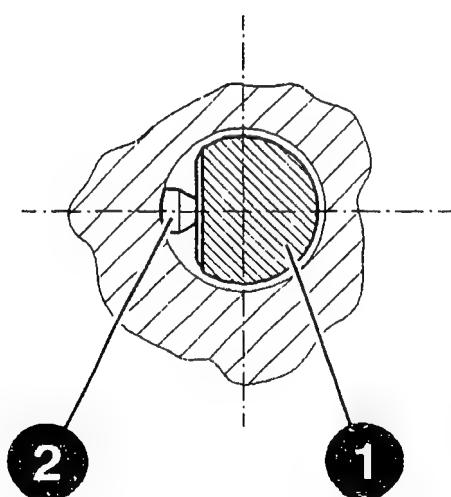


ASSEMBLY NOTE

1 = Adjusting pin
2 = Guide pin

When installing adjusting pin,
ensure stepped area is correctly
positioned with respect to guide pin.

KMK08276



- 1 = Stop-housing mark
- 2 = Assembly-gauge mark
- 3 = Recess, locating adjusting pin
- 4 = LDA adjusting pin

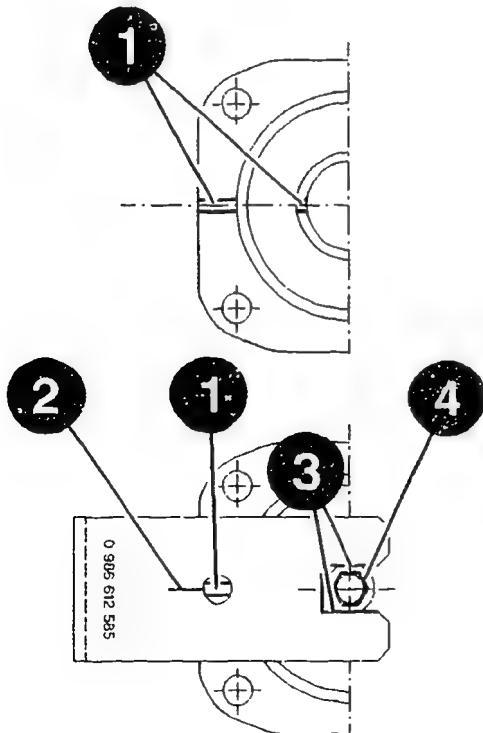
Insert LDA adjusting pin.

Align adjusting pin by way of recess at assembly gauge such that mark on gauge coincides with mark on LDA housing (can be seen through hole).

Fit LDA cover and press it down slightly.

Pull out assembly gauge and secure LDA cover, taking care not to turn the adjusting pin.

KMK08277



Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

INJECTION-PUMP
ASSEMBLY
0 402 698 033
(Mercedes-Benz)

Workshop: EP
02.1997
ST 0550 En

Modified delivery setting

Delivery setting for control-lever injection pumps with assembly number 0 402 698 033 was altered several times during the production period FD 57102 to 66322.

Use is to be made for checking and adjustment of specific test values referenced to the date of manufacture.

FD 57102...57108
Test specif. sheet 0 402 698 033 F1

FD 57109...66213
Test specif. sheet 0 402 698 033 F2

FD 66214...66321
Test specif. sheet 0 402 698 033 F3

Bosch Service Stations in Germany can call up the appropriate sheets from KH/VSK via videotext; RG/AV should use the normal RG/AV link.

published on the WP microcard next
time it is distributed.

Published by:

Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)

Please direct questions and comments
concerning the contents to our
authorized representative in your
country

IN-LINE PUMP
SIZE M/RSF III

Workshop: EP
10.1997
SI 0565 En

Pre-stroke/start of delivery setting
Modified return threaded bush

SPECIAL FEATURES OF PUMP

- * All fuel connections at fuel injection pump and supply pump are of plug-in type with plastic plug-in couplings and retainers.

PRE-STROKE SETTING (STATIC)

Prerequisite:

Fuel feed and return pipe not fitted.
Turn camshaft in direction of rotation
to set roller tappet of start of
delivery adjustment cylinder
(cylinder 1) to BDC.
Attach pre-stroke measuring device
0 681 440 017 at cylinder 1.

Set measuring device to 0.

Set adjustment cylinder to pre-stroke as per test-specification sheet (mean value) and set pointer of test-bench graduated disk to 0 or to a convenient initial value for calculation.

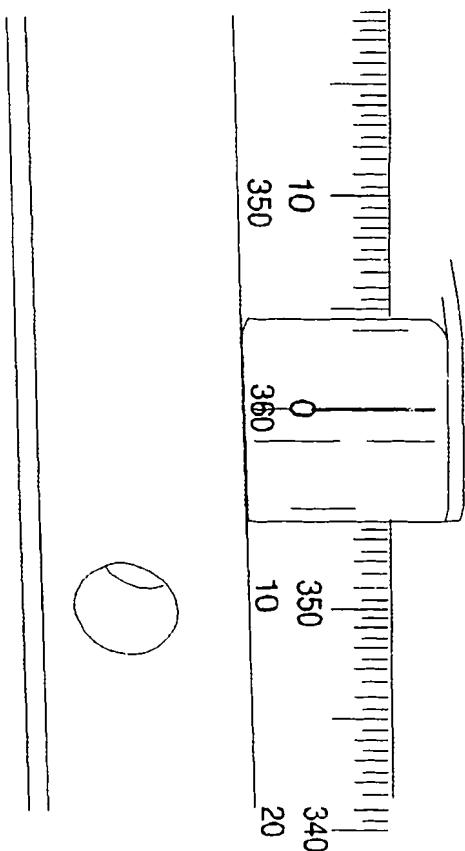
Make no further adjustment to pointer at graduated disk.

Remove pre-stroke measuring device.

ATTENTION:

Never crank camshaft of fuel-injection pump with pre-stroke measuring device fitted, as otherwise sensor will be damaged.

KMK04573



CHECKING START OF DELIVERY (HYDRAULIC)

Attach test connection for checking start of delivery using appropriate connection parts from connection set 1 687 010 083.

Parts set for M/RSF:

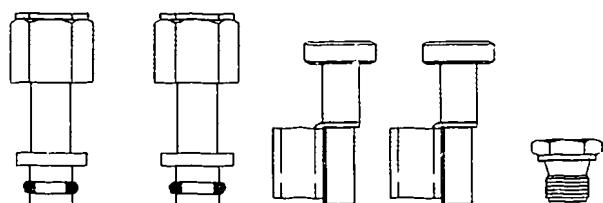
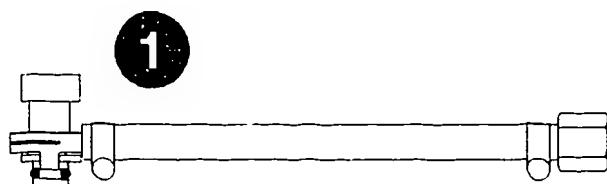
1 = Hose

3/1, 3/2 = Connection piece

4/1, 4/2 = Clamping pieces

6 = Screw plug

KMK09168



3/1 3/2 4/1 4/2 6

**CALIBRATING-OIL CONNECTION FOR
CHECKING START OF DELIVERY:**

3/1 = Connection piece

2 = Retaining plate

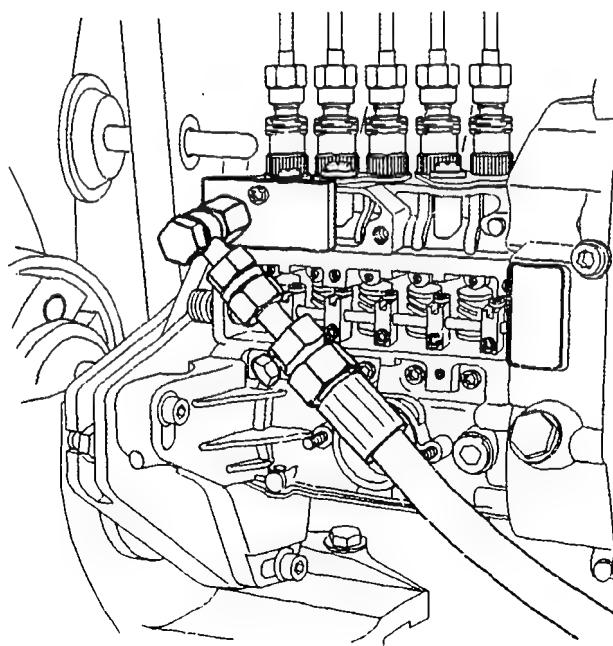
Insert connection piece 3/1 without retaining plate in suction-gallery inlet bore of M/RSF and secure with clamping piece 4/1.

Use banjo bolt to attach calibrating-oil supply line to connection piece.

Insert connection piece 3/2 in return connection (back of suction gallery - not visible in Fig.) and secure using clamping piece 4/2.

Seal off connection piece with screw plug 6.

KMK04563



IMPORTANT:

a = Threaded bush, plug-in type

**Location: Feed and return
connection**

b = Threaded bush, not plug-in type

Location: Return

**Connection piece 3/2 cannot be used
with version b.**

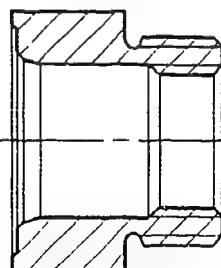
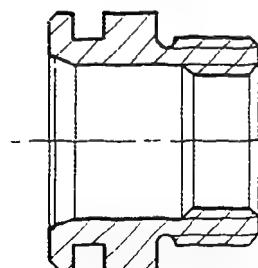
**Seal off return with banjo bolt and
2 packing disks.**

**Check pump with genuine return-flow
restriction from Mercedes-Benz,
part no. 601 070 1046**

KMK09169

a

b



Set CRT measuring device in rack shut-off position to 1 mm CRT.

Set rack to prescribed CRT for checking start of delivery (as per test specification sheet) and block CRT measuring device.

Turn camshaft of fuel-injection pump in direction of pump rotation until start of delivery is attained.

Start of delivery has been attained when jet at overflow pipe of test nozzle-holder assembly becomes a string of droplets.

Pointer of graduated disk must be set to "0" in this position. Correct in line with repair instructions.

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

**EDC DISTRIBUTOR-TYPE
FUEL-INJECTION PUMP
ENHANCED PERFORMANCE**

**Workshop: EP
10.1997
ST 0566 En**

VW have been fitting EDC distributor-type fuel-injection pumps featuring enhanced performance since 01.97.

PERFORMANCE FEATURES OF DISTRIBUTOR-TYPE PUMP

IDI:

Design up to 450 bar plunger/barrel pressure

DI:

Design up to 600 bar plunger/barrel pressure

HDI-L0: e.g. VE..R595

Design up to 700 bar plunger/barrel pressure

Features: Carbon-coated bearing pin and roller.

HDI-L1: e.g. VE..R638/R642

Design up to 800 bar plunger/barrel pressure

Features: as L0; thrust washer additionally coated

PERFORMANCE FEATURES OF DISTRIBUTOR-
TYPE PUMP

HDI-L2: e.g. VE..R712

Design up to 950 bar plunger/barrel
pressure

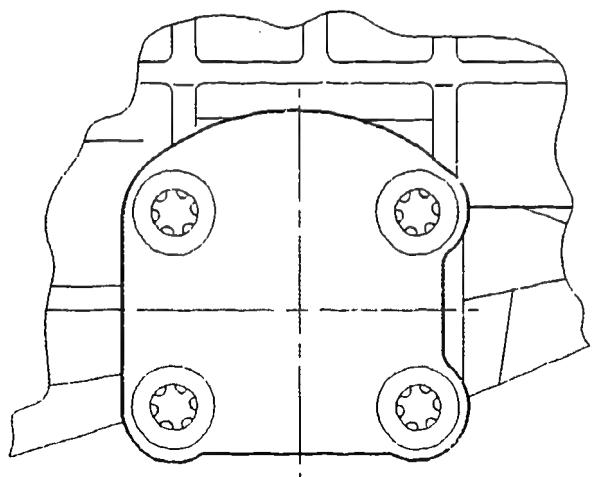
Features: as L1;
yoke additionally
carbon-coated.

HDI = High-pressure DI

FEATURES OF ENHANCED-PERFORMANCE (L2) VE-EDC PUMP

- 4-hole mount for timing device cover with sealing plate (Fig.) (does not affect Ford-VE..F)
- Central screw plug with modified sealing surface

KMK09166



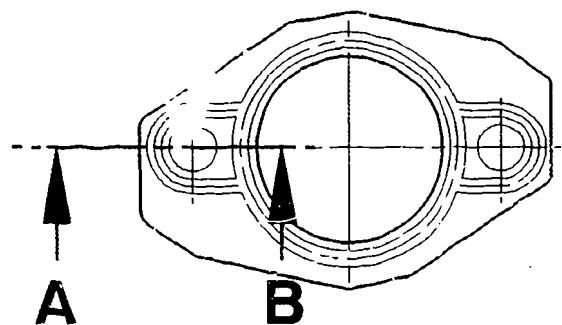
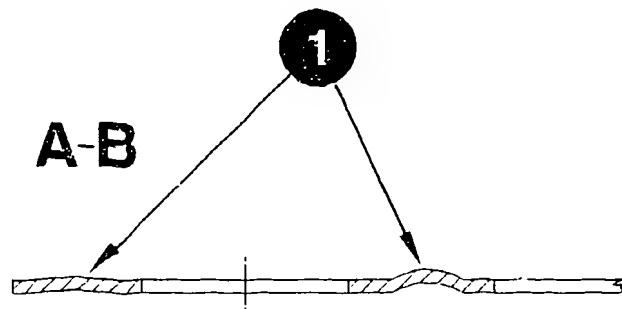
FEATURES OF ENHANCED-PERFORMANCE (L2) VE-PUMP

Pay attention to installation position when fitting timing-device sealing plates.

Curved sealing area must face inwards (timing device bore).

1 = Curved sealing area

KMK09167



SAFETY MEASURES

For safety reasons (destruction of inspection port), existing measuring unit for timing device travel must be adapted to hydraulic requirements. L2-VE pumps are not to be checked using the heavy-duty measuring unit for timing device travel 1 688 130 139 with aluminum body. Measurement of timing device travel is not part of incoming inspection. Timing device profile is not to be checked/adjusted until a suitable measuring unit for timing device travel has been introduced.

SAFETY MEASURES

- Only drive pump with locking mechanism in clamping bracket.
- Pay attention to heat generation of pump, nozzle-and-holder assembly and delivery tubing (danger of burns)
- Wear ear protection on account of pump noise
- Switch on extractor on account of gaseous emissions from and evaporation of calibrating oil.

The following VE..E pumps are affected

0 460 414 990	VE	R712	VW
0 460 414 889	VE	R712-1	VW
0 460 404 973	VE	L720	Rover
0 460 404 999	VE	L718	VM
0 460 426 999	VE	L719	VM

Distributor-type fuel-injection pumps are to be recorded as follows:

In plain-language field C:
ETF 1 688 130 139 prohibited
Field 80: X

ETF = Component part missing

Published by:

Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)

Please direct questions and comments concerning the contents to our authorized representative in your country

FUEL-INJECTION PUMP
ASSEMBLY
0 402 698 033
(Mercedes-Benz)

Workshop: EP
10.1997
ST 0550 En

Alteration to delivery setting

Control-lever fuel-injection pumps with assembly number 0 402 698 033 were subjected to several changes in delivery setting in the production period FD 57102 to 76319.

Use is to be made for checking and adjustment of specific test values referenced to the date of manufacture.

FD 57102...57108	
Test spec. sheet	0 402 698 033 F1
FD 57109...66213	
Test spec. sheet	0 402 698 033 F2
FD 66214...66321	
Test spec. sheet	0 402 698 033 F3
FD 66322...76319	
Test spec. sheet	0 402 698 033 F4

The test specification sheets can be called up for Bosch Service Stations in Germany from KH/VSK via BTX and for RG/AV via the usual RG/AV link.

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

Please direct questions and comments concerning the contents to our authorized representative in your country

FENDT TRACTOR
FAVORIT 822/824
MAN D 0826 LE 522/523

Motor vehicles: NKW
and Workshop: EP
07.1997
ST 0562 En

Leakage at control-lever mount of
governor cover

Suggested governor conversion for fuel-
injection pump assemblies

The following fuel-injection pump
assemblies (EPK) can be converted
in line with these conversion in-
structions in the event of the
customer complaint "External
lubricating oil leakage".

The following may be affected:

EPK 0 403 486 105
Pump 0 413 406 225
(PES 6 MW 100/321RS 1231)
Governor 0 420 085 209
(RSV 300...1100 MW0A343-1)

EPK 0 403 486 106
Pump 0 413 406 226
(PES 6 MW 100/321RS 1232)
Governor 0 420 085 210
(RSV 300...1150 MW0A343-2)

With these fuel-injection pump assemblies, leakage may occur as a result of wear at the control-lever mount. If such leakage is confirmed where damage has occurred, the governor is to be converted to the heavy-duty version (HD) by installing a different governor cover and a different flyweight unit.

EPK 0 403 486 105
Pump 0 413 406 225
(PES 6 MW 100/321 RS 1231)
Governor 0 420 085 209
(RSV 300...1100 MW0A 343-1)
New governor cover: 1 425 628 666
New flyweight assembly: 1 428 194 025

EPK 0 403 486 106
Pump 0 413 406 226
(PES 6 MW 100/321 RS 1232)
Governor 0 420 085 210
(RSV 300...1150 MW0A 343-2)
New governor cover: 1 425 628 667
New flyweight assembly: 1 428 194 025

Stipulation:

During the warranty period, such damage is covered by way of the normal warranty.

35 WU are remunerated for the conversion work (without incoming inspection).

If leakage is found at the control-lever mount after the warranty period has expired, an extension of 3 years will be granted.

The number of hours of operation must then however not exceed 6000.

Damaged parts removed must be submitted to BOSCH, as otherwise costs cannot be reimbursed.

Replacement parts and conversion costs will be fully reimbursed. The costs of removing and installing the fuel-injection pump assembly are to be invoiced to the customer.

The following entries are to be made in the warranty/goodwill claim G20/G21:

Fault number : 40

Warranty type: 0(warranty)/7(goodwill)

C section : Job card number

Plain lang. : R0497-FENDT

Box 80 : "X"

Damaged parts are to be submitted together with warranty claim (G20/G21) and delivery slip KH/VKD 3 - 15333-2 to the following address:

Within Germany:

Robert Bosch GmbH

FEW/LOG 3 - Auspackraum

for forwarding to K5/QSG 1 - Hugo

Am Boschwerk

70469 Stuttgart

In all other countries:

**To local BOSCH representative
for forwarding to K5/QSG 1 - Hugo**

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

IN-LINE PUMP
M/RSF

Workshop: EP
10.1997
SI 0574 En

Delivery valve modification

Assemblies affected:

0 400 075 925
0 400 075 926
0 400 076 954
0 400 076 955

With 5 and 6-cylinder naturally aspirated engines loud combustion noise is occasionally encountered in the warm-up phase in the engine-speed range 1200...1800 1/min.

Remedy:

- * Remove delivery valves 1 418 502 210
- * Fit delivery valves 1 418 502 217
- * New copper packing 1 410 105 021
- * Fit O-rings for delivery valve holder 1 460 210 321.

Procedure for handling above complaint

- * Delivery valve conversion may only be commissioned by Daimler-Benz branch offices.
- * In the event of direct customer/Bosch Service contact, vehicle owners are to be referred to the appropriate Daimler-Benz branch office.
- * The conversion costs are the responsibility of the branch office which commissioned the order.

- * After conversion, enter a "Y" on rating plate of fuel-injection pump after the assembly part number.

The fuel-injection pumps are set in line with the appropriate test specification sheet.

Set delivery rates by moving clamping pieces (in shutoff direction).

After setting injected quantity, check that control sleeves do NOT become disengaged from clamping pieces in shutoff or start position.

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**

DISTRIBUTOR-TYPE
FUEL-INJECTION PUMP
VE..F..

Workshop: EP
10.1997
SI 0575 En

VE..R622,-1 Ford
VE..R601,-1 Peugeot

Information on repair and checking of
the above pumps.

ENABLING DIESEL ANTI-THEFT ALARM (DDS)

* Ford: R622,-1

Enabling is performed with KTS 300 and
a special test program, which diagnoses
and enables the DDS.

* Peugeot: R601,-1

Before detaching system connector,
release DDS1 by way of keypad.

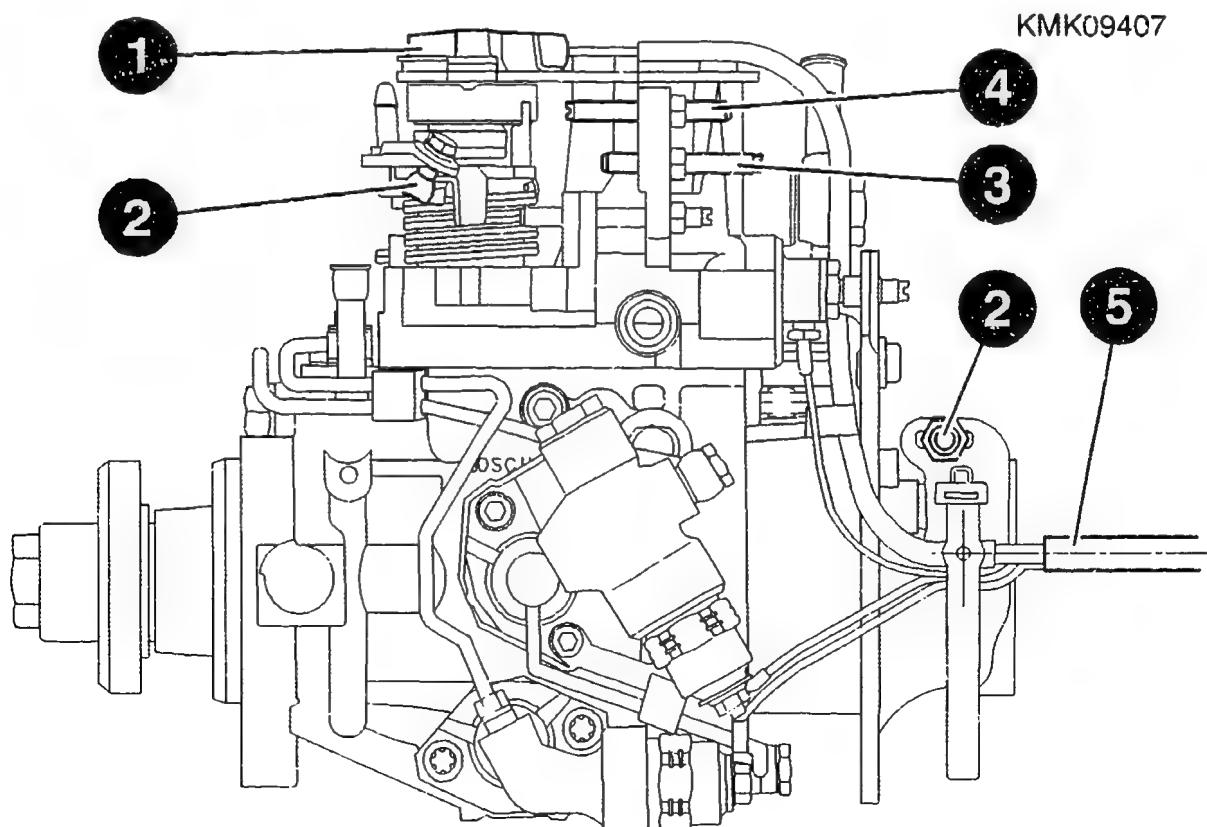
Only detach system connector with
ignition switched on.

When pump is delivered, it must be
accompanied by a certificate stating
that DDS1 has been released.

For further procedure refer to micro-
card W 400/...

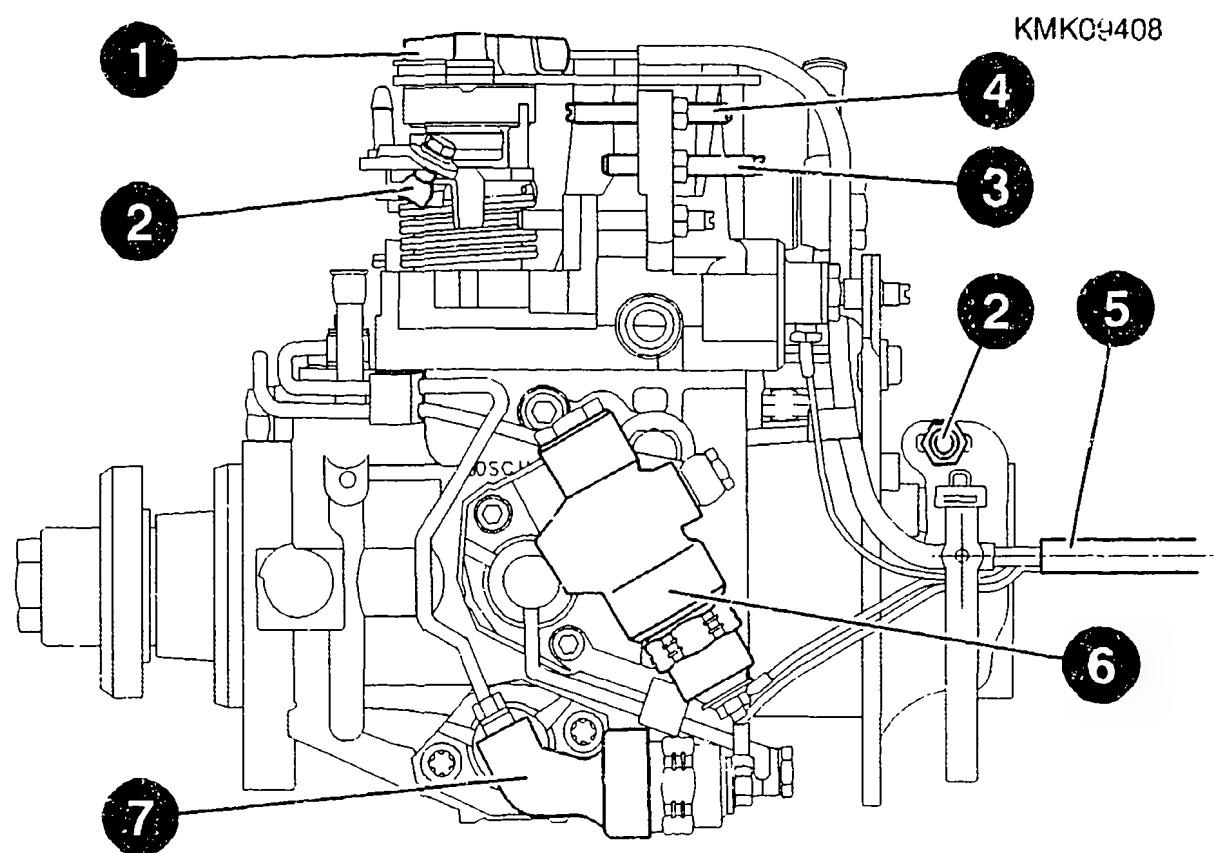
SPECIAL FEATURES:

- 1 = Potentiometer
- 2 = Power on/off damper (Fig. shows spherical bolt for accommodating damper).
- 3 = Adjusting screw, 3rd injected-quantity stop
- 4 = Adjusting screw, 4th injected-quantity stop
- 5 = Leads for potentiometer, DDS, cold-start acceleration device (KSB) and ALFB (disconnectable load-dependent start of delivery) in joint 8-pin plug.



SPECIAL FEATURES:

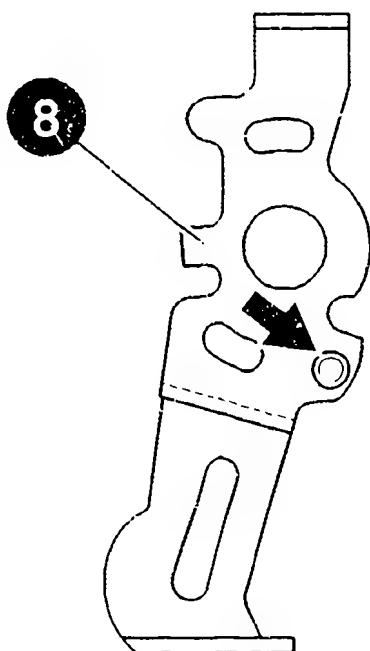
- 6 = Hydraulic cold-start acceleration device (KSB)
- 7 = Disconnectable load-dependent start of delivery (ALFB)



SPECIAL FEATURES:

8 = Control lever with mounting hole
(arrow) for stop screw
0 986 612 690

KMK09409



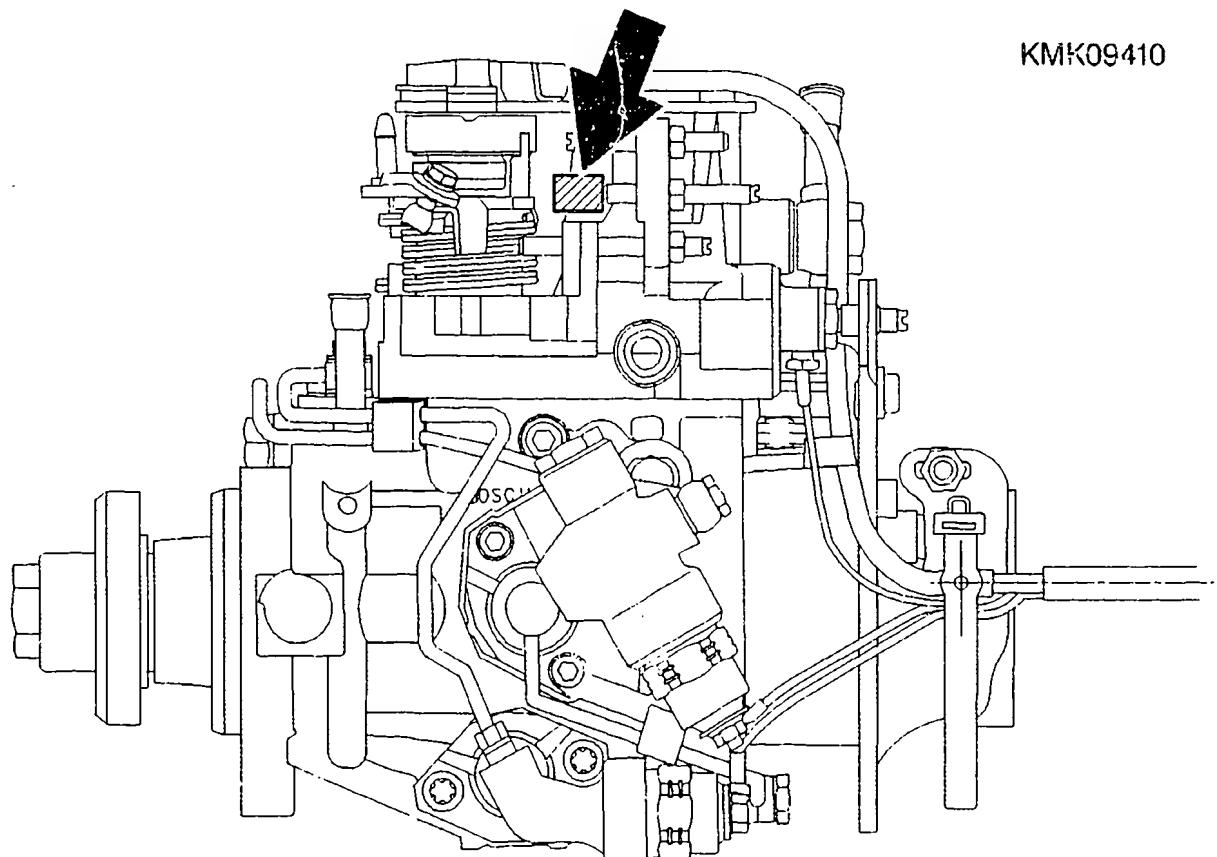
SETTING PART-LOAD QUANTITY FOR EGR

* Setting procedure, 3rd injected quantity stop

Arrow = Spacer

Insert spacer as per test specification sheet between control lever and delivery stop screw.

At stated speed for ARF3 set delivery at stop screw.



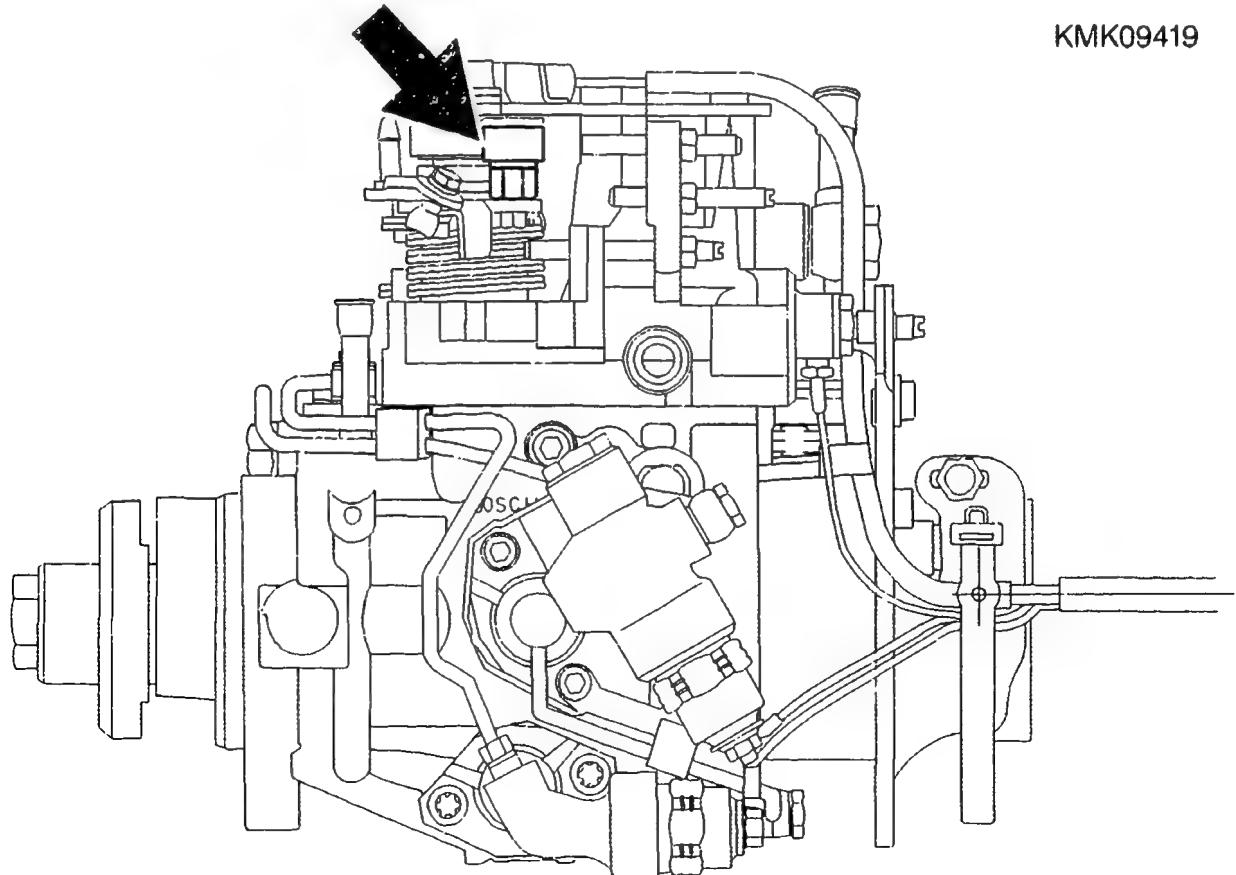
SETTING PART-LOAD QUANTITY FOR EGR

* Setting procedure, 4th injected quantity stop

Arrow = Stop screw (analogous)

Screw stop screw 0 986 612 690 into mounting hole at speed-control lever and tighten slightly.

KMK09419



SETTING PART-LOAD QUANTITY FOR EGR

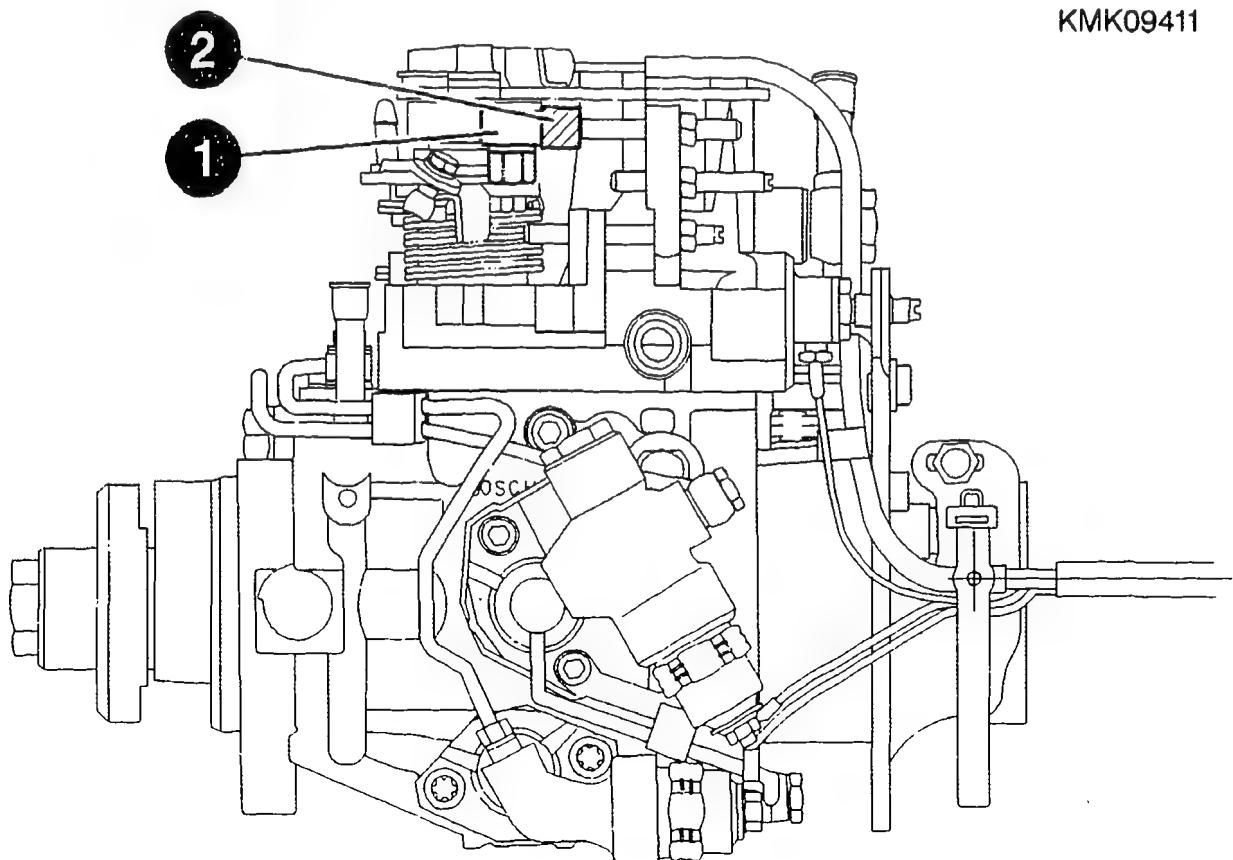
* Setting procedure, 4th injected quantity stop

1 = Stop screw

2 = Spacer

Insert spacer as per test specification sheet between control lever and stop screw 0 986 612 690.

At stated speed for ARF4, set delivery at stop screw.



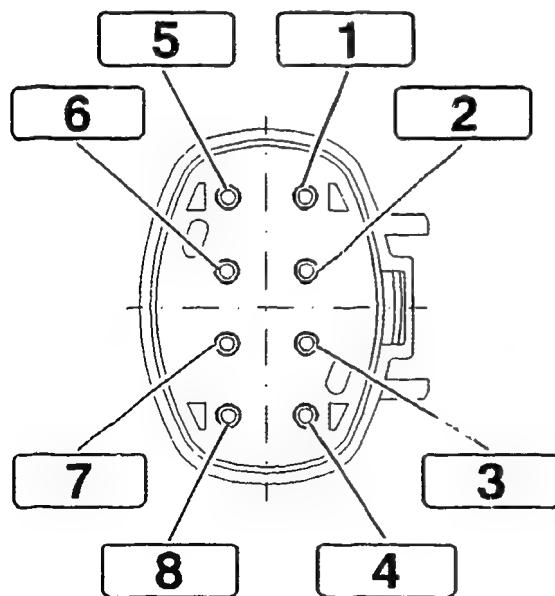
KMK09411

SETTING POTENTIOMETER

Pin assignment VE..R622,-1

- 1 = Ground, potentiometer
Core color: black
- 2 = Output voltage, potentiometer
Core color: light blue
- 3 = Supply voltage, potentiometer
Core color: brown
- 4 = ALFB
Core color: green
- 5 = Supply voltage, DDS
Core color: black/violet
- 6 = KSB
Core color: yellow

KMK09412



SETTING POTENTIOMETER

PIN ASSIGNMENT VE..R622,-1

7 = DDS signal
Core color: white/red
8 = DDS ground
Core color: brown

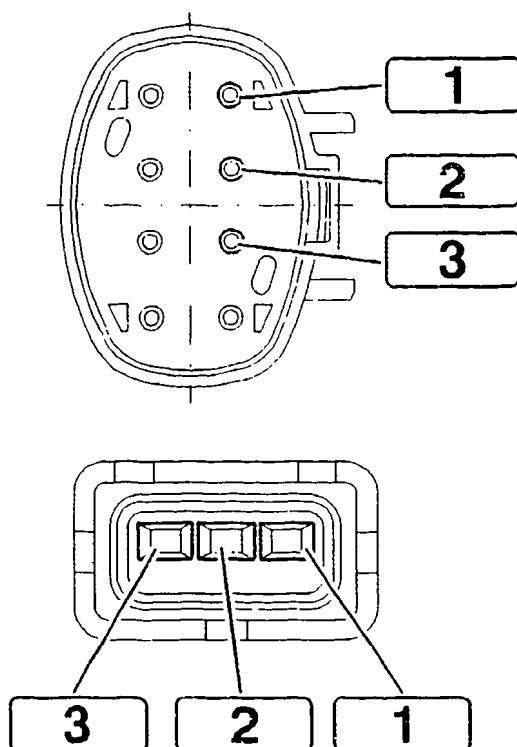
PIN ASSIGNMENT VE..R601,-1

1 = Ground, potentiometer
2 = Output voltage, potentiometer
3 = Supply voltage

Fig. a = R622,-1

Fig. b = R601,-1

KMK09413



SETTING POTENTIOMETER

Prerequisite:

VE pump completely set as per test specification sheet.

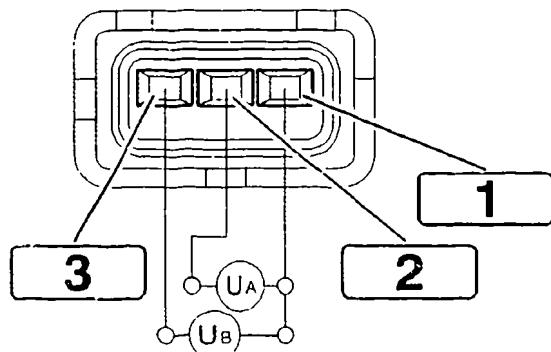
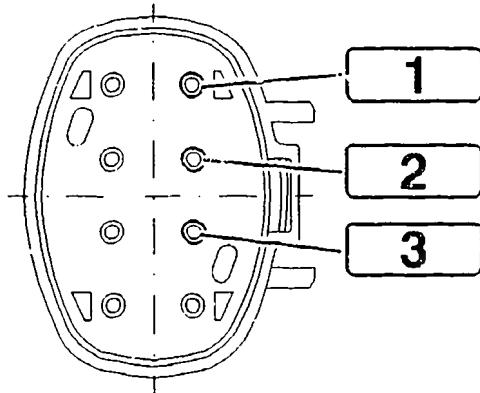
Apply 5 V with suitable individual test leads from test cable set to plug contacts 1 and 3.

Connect voltmeter for testing desired potentiometer voltage to plug contacts 1 and 2.

Fig. a = R622,-1

Fig. b = R601,-1

KMK09414



SETTING POTENTIOMETER

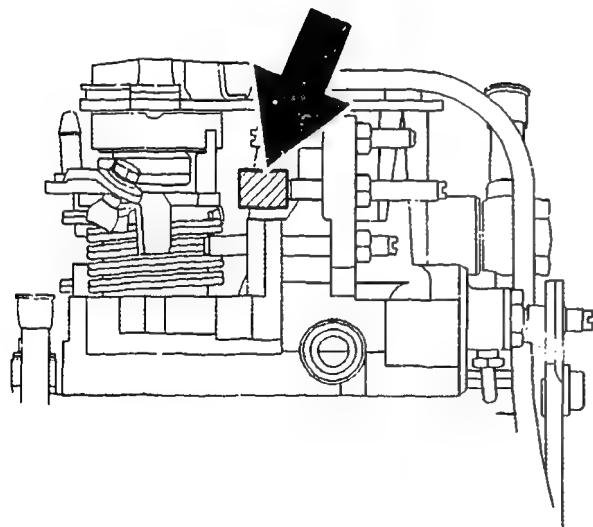
* Desired voltage, 3rd injected quantity stop

Arrow = Spacer

Insert spacer as per test specification sheet between speed-control lever and 3rd delivery stop.

Set desired voltage (measurement voltage 2 as per test specification sheet) for 3rd injected quantity stop by turning potentiometer housing.

KMK09415



SETTING POTENTIOMETER

* Desired voltage, 4th injected quantity stop

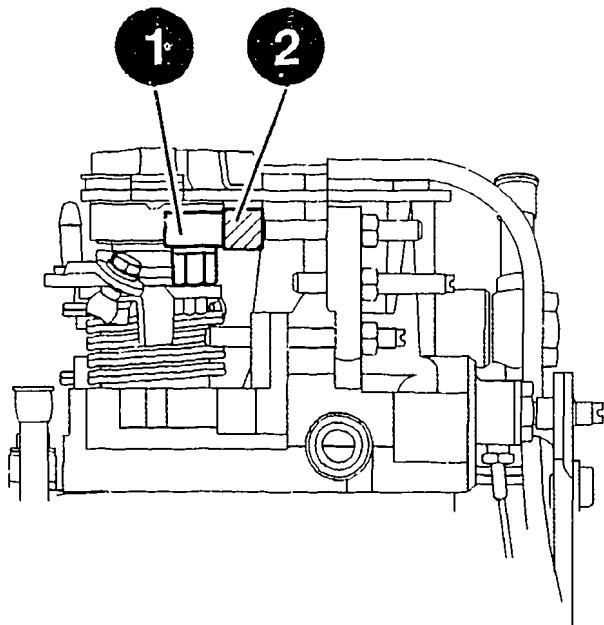
1 = Stop screw (analogous)

2 = Spacer

Insert spacer as per test specification sheet between stop screw 0 986 612 690 and 4th delivery stop.

Desired voltage (measurement voltage 3 as per test specification sheet) must be within tolerance.

KMK09416



RELEASING PLUG CONTACTS

1 = Cap

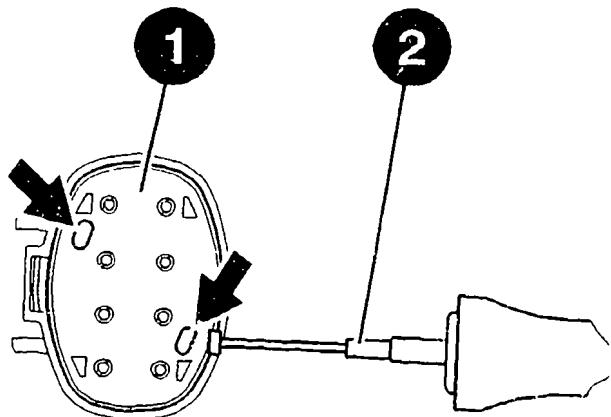
2 = Hooked tool

On replacing potentiometer or DDS, corresponding pins must be removed from plug on pump end.

Note: Covers of replacement potentiometers are red.

To do so, insert hooked tool (e.g. Stahlwille, part no. 1573) into one of the recesses (arrows) provided, release cap (red) and pull off.

KMK09417



RELEASING PLUG CONTACTS

Arrow = Housing lock

Release housing lock.

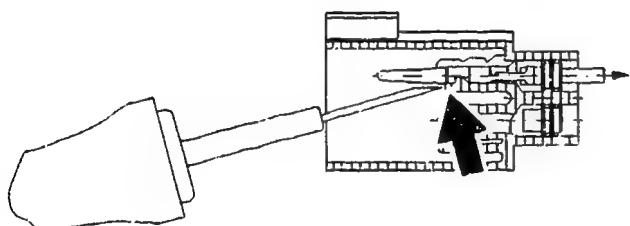
To do so, insert tool (see Fig.) in compartment and lift housing lock.

Pull round connector out of compartment.

Important:

Take care not to damage plug housing (housing lock).

KMK09418



FITTING PLUG CONTACTS

Insert plug as per assignment diagram (pin assignment section) and make sure it engages.

Take care not to damage core seal at round connector.

Insert cap (red) in plug housing and press down until cap engages.

Published by:

Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)

Please direct questions and comments concerning the contents to our authorized representative in your country

MECHANICAL GOVERNOR
RQV..K
WITH TEMPERATURE-DEPENDENT
STARTING FUEL DELIVERY
LIMITATION (TAS)

Workshop: EP
10.1997
SI 0571 En

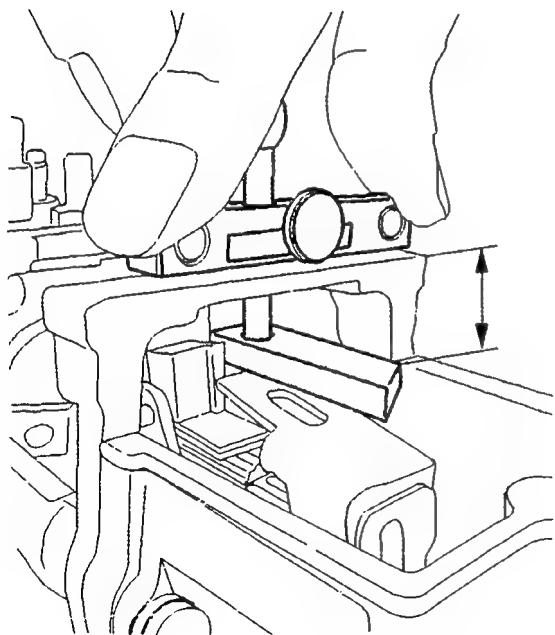
Adjustment instructions

Contrary to the test instructions, the following settings are to be made on RQV..K governors with TAS.

Drive IP assembly at speed to which maximum CRT is assigned in test specification under "torque control profile". Set control lever to "full".

Use measuring device 0 986 611 917 (KDEP 1152/3) to measure distance between top edge of housing and top edge of stop rocker. Shut off IP assembly.

KMK09306



Use depth gauge to measure distance between sealing surface of cover and "lowest" point of curved path of full-load stop. The difference between the two dimensions is the shim thickness required between stop cover and cam.

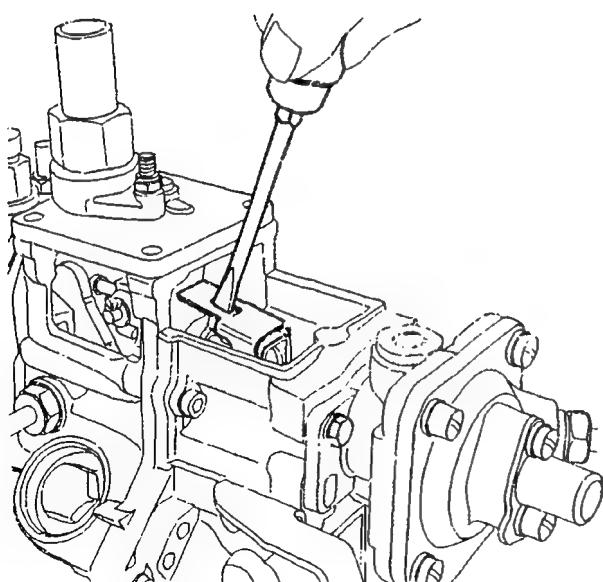
Fit shims of determined thickness.

Screw in TAS until normal delivery stop is horizontal to stop plate.

Fit cover with TAS and full-load stop to pump housing. Do not forget gasket!

Check full-load CRT. To do so, apply max. boost pressure to LDA. Correction is made by way of latching screw in connecting link to rack.

KMK09307

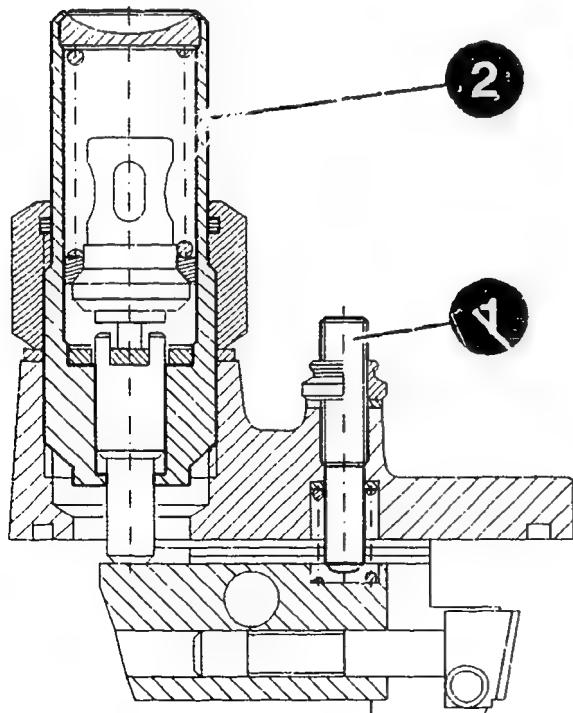


Check full-load quantity without boost pressure. Correct at stop screw in LDA cover.

Cold-start interlock:

Do not apply boost pressure to LDA. Screw out stop screw (1). Drive fuel-injection pump at a speed 25 l/min below idle speed (lower rated speed). Move control lever back and forth between full-load and idle stop and in doing so screw in TAS (2) until full-load CRT without boost pressure is just released (CRT step change approx. 1.5 mm).

KMK09308



Screw in adjusting screw (1) until full-load stop is just interlocked again. Lock adjusting screw.

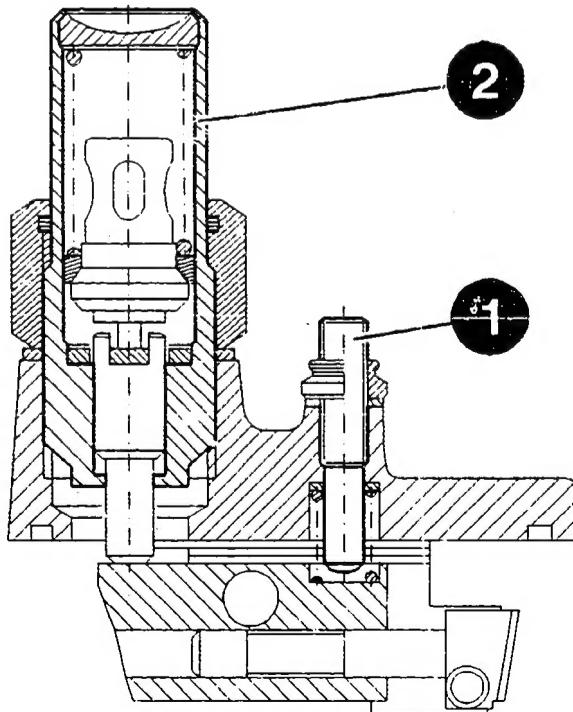
Drive fuel-injection pump at 100 l/min. Max. starting CRT of approx. 21 mm must be attained.

Check cold-start delivery as per test specification.

Warm-start interlock:

Drive fuel-injection pump at 100 l/min. Move control lever back and forth and in doing so screw out TAS (2) until step change to full-load CRT without boost pressure is attained. Lock TAS with nut.

KMK09308



Checking:

At speed of 0 l/min, warm-start CRT must be attained on actuating control lever.

Cold-start CRT must not be attained. Warm-start delivery must be attained at prescribed speed.

Published by:

Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)

Please direct questions and comments concerning the contents to our authorized representative in your country

SERVICE TOOL
0 986 612 694
HOLDING TOOL

Workshop: EP
10.1997
SI 0577 En

Alteration to bolt length M 12 x 70
for tool application on SCANIA-P and
H fuel-injection pumps.

When attaching tool to Scania drive
flange, the 70 mm long bolts forming
part of the tool project slightly.
On H pumps, this results in contact
with securing bolts for pump drive-
end bearing cap. Consequently, the
camshaft cannot be turned.

In order to be able to use the tools
already delivered for Scania pumps
as envisaged (refer to appropriate
test instructions), the M12x70 bolts
are to be shortened by 5 mm to 65 mm.
Alternatively, the existing bolts can
be used together with 5 mm thick
washers.

As of date of manufacture 769, the tool
0 986 612 694 will only be supplied
with the matching M12 x 65 bolts.

Published by:

**Robert Bosch GmbH
Division KH
After-Sales-Service Department for
Training and Technology (KH/VSK)**

**Please direct questions and comments
concerning the contents to our
authorized representative in your
country**